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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 19 JANUARY, 1936 NUMBER 1

THE CARBOHYDRATE MATRIX OF THE EPITHELIAL-CELL INCLUSION IN TRACHOMA

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Although the inclusions found in trachoma were first described by Von Prowazek and Halberstaedter in 1907, since then very little has been done to discover the nature and composition of these bodies.

This microchemical study of the Von Prowazek-Halberstaedter inclusion body found in the cytoplasm of epithelial cells from trachomatous conjunctivae indicates that this inclusion contains a high concentration of some carbohydrate. The evidence would seem to indicate that this carbohydrate is glycogen. The carbohydrate is a matrix in which are suspended or embedded the so-called initial bodies of Lindner and the elementary bodies of Von Prowazek. The questions raised from this study are: 1. What is the origin of the carbohydrate? 2. Why does it not quickly diffuse throughout the cytoplasm in preparations made to study fresh unfixed cells? 3. What is the significance of the fact that the inclusions found in inclusion-body blennorrhea apparently have the same composition as the inclusions found in trachoma? 4. What is the relationship of the so-called elementary bodies of Von Prowazek and the initial bodies of Lindner to the carbohydrate matrix in which they are embedded? 5. If the carbohydrate of the trachoma inclusion is a cytoplasmic reaction to irritation from a visible or invisible virus, then do any of the other known virus diseases produce inclusions which are concentrations of glycogen? Read before the St. Louis Ophthalmic Society, October 25, 1935.

Since the inclusion body found in the epithelial cells of the trachomatous conjunctiva was first described, in 1907, by v. Prowazek and Halberstaedter[1] much work has been done in many parts of the world in attempting to ascertain the role played by this element in the etiology of trachoma. Opinions have varied widely as to the nature of the epithelial inclusion in this disease. Some workers have thought of it as merely phagocytosed bacteria.[2] Lately Thygeson[3] has advanced the idea that the inclusion body represents a stage in the life cycle of a virus which is the etiological agent of trachoma.

This study represents an attempt to determine microchemically something of the nature of the v. Prowazek-Halberstaedter inclusion, regardless of whether it is specifically concerned with trachoma or not.

The work is based on observations on 17 patients having active trachoma hospitalized at the United States Trachoma Hospital, Rolla, Missouri. The ages of these individuals ranged from six to fifty years. The duration of the disease varied from a few weeks to several years. Inclusion bodies were found in all. Two of the cases were of monocular trachoma, both being in adults. One of the seventeen is a professional wrestler.

In these studies, light scrapings were made from the palpebral conjunctiva without the use of any local anesthetic. Often these scrapings were made without drawing any blood and certainly without much discomfort to even young children. It was found to be important not to secure too much material on the dull scalpel blade used. A Beebe loupe was very useful, as the small amount of material on the knife blade might not have been visible without a slight magnification. Heat fixation of the specimen or fixation in 95-percent alcohol for 30 minutes was used.

Staining of fixed cells in a modified Lugol's solution. The iodine solution was made up of equal parts of Lugol's solution and tap water. This solution was run over the fixed smear, which

was then observed immediately without removal of the excess solution. In some of the epithelial cells, inclusion bodies were found in the cytoplasm, which gave a deep red-brown color reaction, while the cells stained hardly at all.

In looking over a fixed smear stained in this way, it is not necessary to wait for the slide to dry, as the iodine-color-reacting inclusion shows up better under low power with the slide still wet.

Fixed smears were next treated in a stronger iodine preparation, an unmodified Lugol's solution. The slides were left in the solution about two minutes, then dipped a few times in 95-percent alcohol containing 10-percent iodine, and finally dipped once in 80-percent alcohol and allowed to dry. These can be observed with oil-immersion lens. Figure 1 shows such an inclusion with the marked color reaction from the iodine solution. A faint outline of the nucleus can also be seen.

Figures 2 and 3 also illustrate how the deep red-brown stain of the inclusions appears under the oil immersion. This iodine stain may be used in rather thick smear preparations and the stained bodies easily identified. As is seen in the illustrations, the contrast between the inclusions and the general background is marked.

Staining of fresh unfixed cells with iodine. In staining unfixed cells, a still weaker solution of iodine was used. Too concentrated a solution of iodine would partly fix the cell, of course, and certainly hinder or even prevent the disappearance of the iodine-color-reacting substance from the inclusion, which is to be described later. One drop of Lugol's solution was mixed with 10 drops of normal saline. A drop or two of this very weak solution was placed on a slide and the material, secured by a very delicate scraping, placed in the drop. After a few seconds, a thin cover slip (no. 2) was dropped on and squeezed down as tightly as possible. The cover slip was ringed with melted vaseline and the specimen then observed.

The inclusions in the epithelial cells show the red-brown color as vividly as in the fixed cells, as is illustrated in figure 4. In these wet preparations, the inclusions usually appear globular or circular in shape, and opaque, and may show such a dense iodine color reaction as to be homogeneous in appearance. If too much tissue is in the scraping or not enough of the solution has been placed on the slide, the inclusions may stain very faintly, as most of the iodine appears to be absorbed by the tissue present. It is well, after having teased the specimen in the drop of fluid, to add an extra drop of the weak iodine solution before covering with the cover slip.

The probable carbohydrate nature of the substance in the epithelial-cell inclusions giving the color reaction with iodine. The color reaction of the inclusions in the epithelial cells in the trachoma cases studied by the above methods, is thought to be due to the presence of a carbohydrate. The evidence would seem to indicate that this carbohydrate is glycogen. The evidence is as follows:

A. The color reaction is distinctly sharp, such as is given by Lugol's solution with some of the polysaccharides.[4] The reddish-brown or amber color of this reaction is identical with that of pure glycogen when a small amount of glycogen is rubbed up with glycerine on a slide, a few drops of the iodine added, and a cover slip applied.[5]

B. In the wet preparations, if the slide is carefully heated over an alcohol lamp alongside the microscope and is then quickly observed, the vivid color will be found to have faded considerably in the inclusion; however, much of the color returns as the slide cools.

After adding iodine to a test tube containing either a glycogen or starch solution, the color reaction will fade with heating and reappear on cooling.[6]

C. In the wet preparation, the reddish-brown color fades and in 12 to 18 hours will usually be found to have entirely disappeared. The cell inclusions will not give the color reaction again when fresh iodine solution is introduced under the cover slip. This shows that the substance giving the reaction has either changed its nature or has

been dissolved out of the cytoplasmic inclusion. A carbohydrate would probably do either or both. One should be cautioned to use a sufficient amount of the iodine solution and especially to use a freshly diluted liquid which has been made from a stock iodine solution that is not too old.

D. Amyloid, which may give a color reaction with Lugol's solution not unlike some of the polysaccharides, is not soluble in normal saline or tap water.[7]

E. If the fixed smears containing epithelial-cell inclusions showing the iodine color reactions are treated with concentrated sulphuric or hydrochloric acid, the only change is one of rather rapid fading of the reddish-brown color, and often the color disappears entirely within five minutes. This is better demonstrated in thin smears. Amyloid under such procedure would usually manifest an intensification of the iodine color reaction or a series of color changes, certainly not disappearance of the color altogether.[8]

F. The simplest and quickest method of removing the color-reacting substance from the cytoplasmic inclusion *if the smear has been fixed by heat*, is by dropping a small amount of saliva on the smear. The color-reacting substance will often disappear within an hour, as shown by the failure of the color to reappear when the preparation is again treated with the iodine solution after the saliva has been washed off. The smear should be thin to demonstrate this.[5]

G. A more conclusive test showing the action of the saliva was carried out as follows:

Two slides designated "A" and "B" were both fixed in 95-percent alcohol and then stained with the iodine-potassium-iodide solution. Cells were located on each slide which showed the iodine-color-reacting inclusions. The slides were then processed as follows:

Slide A.

Lugol's stain. Color inclusions found present.

Three hours in saliva (diluted 1:8 with normal saline) in a Coplin jar, in incubator at 38°C.

Lugol's stain. Color inclusions disappeared. Outlines distinguishable but reddish-brown color absent. Granules visible in inclusion but not staining.

Slide B.

Lugol's stain. Color inclusions found present.

Three hours in boiled saliva (diluted 1:8 with normal saline) in incubator at 38°C.

Lugol's stain. Color inclusions present.

Three hours in unboiled saliva. Lugol's stain. Color inclusions disappeared.

The only difference in treatment of the two slides was that Slide A was treated with normal saliva while Slide B at first was treated with saliva which had been boiled. The boiling, of course, had destroyed the effectiveness of the ptyalin. The color-reacting substance of the inclusion was undoubtedly digested by ptyalin.

Immersion of heat-fixed smears in distilled water for 100 hours has not caused the disappearance of the iodine-color-reacting substance. Smears fixed in 95-percent alcohol, such as the aforementioned smears treated with saliva, have been left in distilled water 224 hours without undergoing the loss of the color-reacting substance.

Smears that have been fixed in alcohol require a longer time in the diluted saliva solution than do those fixed by heat.

H. If normal saline that has been made distinctly alkaline to neutral red with ammonium hydroxide, is passed under the cover slips of one of the wet preparations having the inclusions stained with the weak iodine solution, the color reaction will disappear entirely. A solution of glycogen in a test tube that has had iodine added to it will lose its port-wine color when made alkaline with ammonia water.[6]

I. If the weak iodine solution has a small amount of hydrochloric acid added to it so that it becomes acid to litmus, the epithelial-cell inclusions in the wet preparation will hold the reddish-brown color many days. This is true of the glycogen color reaction with iodine in the test tube when hydrochloric acid is added even in the presence of ptyalin.

J. The inclusions are stained different degrees of red when using Best's carmine stain. Some of the inclusions

Fig. 1

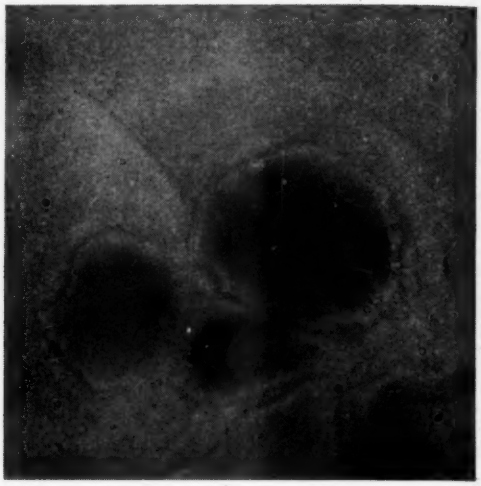

Fig. 2

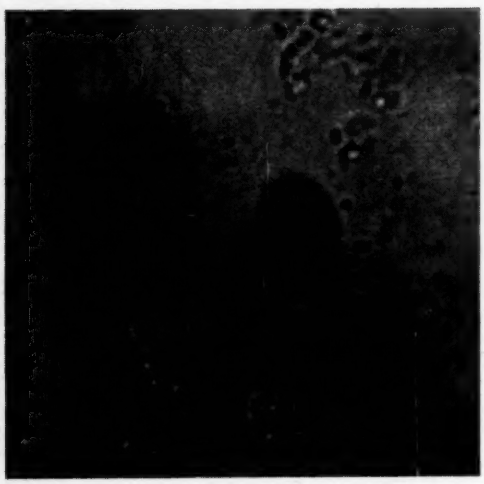

Fig. 3

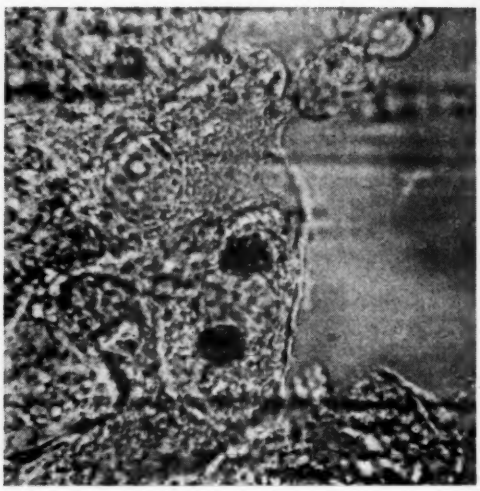

Fig. 4

Fig. 1 (Rice). Epithelial cell, fixed, stained with the weak iodine-potassium-iodide solution. C. filter used. Magnification × 1000.

Fig. 2 (Rice). Two epithelial cells with the red-brown inclusions. Fixed cells. C. filter. Magnification × 1000.

Fig. 3 (Rice). Large iodine-color-reacting inclusion. Cell outline practically filtered out. Magnification × 1000.

Fig. 4 (Rice). Wet preparation—very weak iodine solution. Large epithelial cell with nuclear outline visible and iodine-color-reacting inclusion at each pole of nucleus. C. filter. Magnification × 1000.

may not stain with the carmine just as some stain very faintly with the iodine.[9]

Are these iodine-color-reacting inclusions identical with the v. Prowazek-Halberstaedter inclusions found in the conjunctival epithelial cells in trachoma? The iodine-color-reacting inclusions are probably identical with the inclusion bodies of v. Prowazek-Halberstaedter[1] as they were not found in the conjunctival epithelial cells except in cases that showed the typical v.

Prowazek-Halberstaedter inclusions as brought out by the Giemsa stain. These carbohydrate inclusions show in the fixed cell the same formation and arrangement around the nucleus as do the v. Prowazek-Halberstaedter inclusions stained with Giemsa. (See Figures 1 and 2.)

It is easy to identify the same inclusion bodies by locating one or more of the carbohydrate inclusions stained with the iodine-potassium-iodide solution, decolorizing in tap or distilled water for as long as it takes to remove the reddish-brown color in the inclusions, usually not more than one hour, and then staining with the usual Giemsa stain. There is illustrated in figure 5 an epithelial cell treated in this way. With the stronger iodine solution, the inclusions in this cell showed the deep, uniform reddish-brown color reaction. After one hour in distilled water this reddish-brown color had entirely disappeared. The illustration shows the cell stained with Giemsa.

Further observations on the carbohydrate inclusions in the unfixed epithelial cells of the trachomatous conjunctiva. In order to throw further light on the nature of the carbohydrate inclusions, unfixed cells, from cases known to show numerous inclusion bodies, were placed in varying strengths of brilliant cresyl blue, covered with thin slips, and ringed with melted vaseline. The inclusions were stained remarkably well in the unfixed cell by this stain and photographed well in the wet preparation, as is illustrated in figure 6. There is well shown the sharp line of demarcation the inclusion body gives with the cytoplasmic substance in a cell undistorted by fixation.

A very effective method of demonstrating the inclusions with a vital stain is by using neutral red (1:2,000). By this method an epithelial cell may show no staining of the cytoplasm and very faint staining of the nucleus, but the inclusion will stand out a bright red. The granular nature of the inclusion is especially well shown by the neutral red as well as the sharp line of demarcation separating the inclusion body from the cytoplasm. These granules are undoubtedly the "elementary bodies" of von Prowazek and the "initial bodies" of Lindner.[1, 10]

As stated above, the iodine color reaction in the unfixed cells in the wet preparations stained with the very weak iodine solution, usually disappears entirely within 12 to 18 hours. When the iodine color reaction is at its height the inclusion usually appears as a deeply colored body with a sharp line of demarcation separating the body from the cytoplasm. It appears, therefore, that the carbohydrate inclusions may have a limiting membrane. Some of the inclusions may contain less of the carbohydrate matrix than others. These inclusions will stain more faintly and granular bodies will show through the stain, so that the homogeneous appearance shown by the more densely staining inclusions is not apparent. When the iodine color reaction has disappeared, the inclusion may still be easily identified, as the area of the inclusion in some cells will appear much less dense than the remaining portions of the cell. This is especially noticeable if the 4-mm. objective of the microscope is used. The inclusions lose their homogeneous appearance in the unfixed cell after the disappearance of the iodine color reaction and appear to be crowded to different degrees with distinct granular bodies too small to be photographed but distinctly visible under the oil-immersion lens. Figure 7 shows a group of unfixed cells with two cells showing a large carbohydrate inclusion in each giving the iodine color reaction. These are already starting to fade. Figure 8 shows the same field 18 hours later, the iodine color reaction entirely gone but the granular appearance of the inclusions plainly evident. In another slide it could be seen that more light was coming through the inclusion-body area than through the remaining parts of the cell.

Is the carbohydrate which can be demonstrated in the von Prowazek-Halberstaedter inclusion a matrix or is it a component of the granular bodies contained within the inclusion? If the inclusions are stained with the stronger

Fig. 5

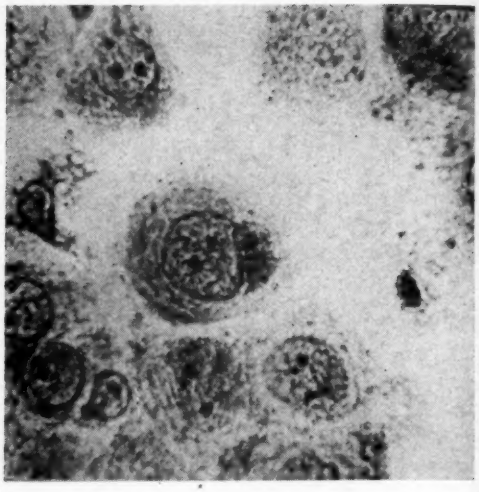

Fig. 6

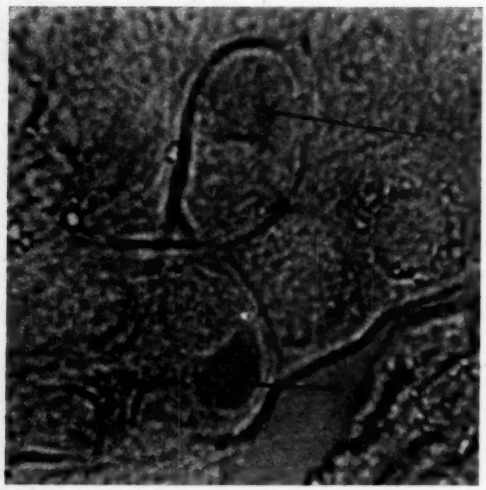

Fig. 7

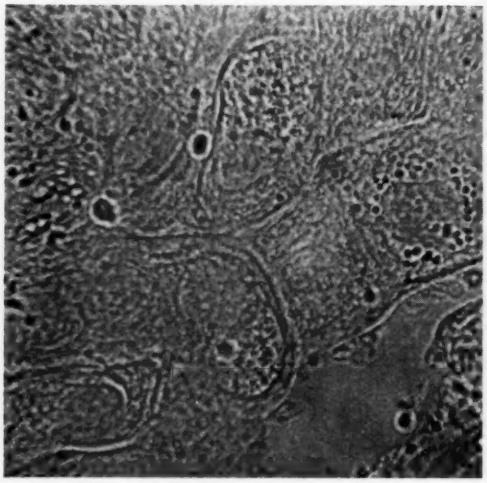

Fig. 8

Fig. 5 (Rice). Alcohol-fixed epithelial cell. Stained first with the strong iodine-potassium-iodide solution. The inclusion showed as a red-brown body. Cell then decolorized in distilled water and stained with Giemsa. The former red-brown inclusion now appeared as a v. Prowazek-Halberstaedter inclusion body of trachoma. Filter B. Magnification × 1000.

Fig. 6 (Rice). Another group of unfixed epithelial cells in wet preparation stained with brilliant cresyl blue (1:200). One cell shows a typical trachoma inclusion capping the nucleus. Inclusion shows a sharp line of demarcation from cytoplasm. No filter. Magnification × 1000.

Fig. 7 (Rice). Wet preparation of unfixed cells in very weak iodine solution, showing two epithelial cells with large iodine-color-reacting inclusions which are fading. No filter. Magnification × 1000.

Fig. 8 (Rice). Same field as in figure 7, twelve hours later with all of iodine-color-reacting substance dissipated from cell inclusions. Inclusions have lost homogeneous appearance and appear distinctly granular and less dense than the rest of the cell. No filter. Magnification × 1000.

iodine solutions and then studied under the oil-immersion lens many will be seen to show an almost uniformly solid staining, such as in illustration 3. After soaking such a smear in water, in order to decolorize, and then staining with Giemsa, some of these solid-staining inclusions will be found to contain comparatively few of the smaller bodies. There will be broad spaces in the inclusion unoccupied by elementary or initial bodies. This would seem to indicate that the carbohydrate is truly a matrix and stains slightly, if at all, with Giemsa. As to whether the granules definitely show this characteristic carbohydrate stain with the iodine solution, I am not prepared to say.

Summary

The use of an iodine-potassium-iodide solution for staining the fixed smears of epithelial scrapings from trachomatous conjunctivae brings out a distinct epithelial-cell inclusion that seems to contain a very appreciable amount of a carbohydrate that reacts with iodine in a manner characteristic of some of the polysaccharides. This polysaccharide is thought to be glycogen. Saliva is highly suitable for quickly proving that the iodine-color-reacting substance in the inclusion is acted upon by the enzyme of the saliva. Study of the epithelial cells in wet unfixed preparations show a cytoplasmic inclusion as sharply demarcated as the nucleus of the cell.

Evidently the disappearance of the iodine-color-reacting substance in the epithelial cell is dependent very much on the reaction of the menstruum in which the scraping from the lid is placed. This reaction may be greatly affected by the solution with which the conjunctival sac is irrigated prior to scraping. The disappearance of the iodine-color-reacting substance is hastened by having the menstruum very slightly alkaline.

It has been found best in studying the appearance of the carbohydrate inclusions under Giemsa, to stain the fixed smears first with the iodine solution, then to decolorize with water before passing the slide through the Giemsa technique. To stain first with Giemsa is not so satisfactory, as all traces of the Giemsa stain in some of the inclusions are difficult to remove.

Glycogen is readily soluble in water to a certain extent, and because of this iodine is considered unsuitable for demonstrating glycogen in fresh tissue.[7] In the case of the glycogen that seems to be massed in the v. Prowazek-Halberstaedter inclusion, it is readily demonstrated in the unfixed cytoplasmic inclusion for several hours and, by making the iodine solution acid to litmus, the glycogen may be demonstrated in the fresh tissue for days. This glycogen can thus be restrained from becoming diffused throughout the cell, indicating the possibility of a limiting membrane. The fact that acidulation will keep the glycogen unchanged for days may simply mean the stopping of an enzyme activity, just as the activity of ptyalin may be stopped by the addition of hydrochloric acid.[11]

The carbohydrate that exists in considerable amounts in the trachoma inclusion can be demonstrated in the smaller inclusions in the initial-body stage and in the inclusions that occupy the whole of the cytoplasmic body.

This carbohydrate is apparently a true matrix in which are embedded or suspended the smaller formed elements known as initial bodies and elementary bodies. It is not the plastin which is often referred to in the literature, as it apparently takes little and usually none of the Giemsa stain. This is especially noticeable in those inclusions of medium size, containing mostly initial bodies, which happen to show considerable spacing between the small bodies. With iodine, such inclusions stain solidly but with Giemsa there is no staining between the initial bodies.

As to the origin of the carbohydrate, it may be a by-product of the special metabolism of the small granules, or it may be formed by a limiting membrane that may exist. It might be formed by the epithelial cell itself as a result of irritation from a virus present within the cell protoplasm. A special metabolism for the inclusion would seem to be indicated by the marked

difference in reaction of the inclusion and the cytoplasm to neutral red. It is of interest to note that the inclusions of inclusion-body blennorrhea show the same reactions to iodine that have been described for those of trachoma.

Conclusions

1. The v. Prowazek-Halberstaedter inclusion body in the epithelial cells of trachomatous conjunctivae contains a very appreciable amount of carbohydrate which gives a sharp color reaction with iodine. The evidence seems to indicate that this carbohydrate in the trachoma inclusion body is glycogen. This carbohydrate evidently exists in part as a matrix or diffused throughout the inclusion.

2. The v. Prowazek-Halberstaedter inclusions may, therefore, be demonstrated with a modified Lugol's solution.

3. With the weak Lugol's solution, the v. Prowazek-Halberstaedter inclusions can be more certainly demonstrated in thick and indifferent smears than with the use of Giemsa stain. For the clinician, this iodine stain should prove a quick and simple method of examining conjunctival scrapings for inclusions.

4. It can be demonstrated that the v. Prowazek-Halberstaedter inclusions in wet preparations of unfixed cells contain varying numbers of easily visible granules, after removal of the carbohydrate matrix. These granules are in all probability the "elementary bodies" of von Prowazek and the so-called "initial bodies" of Lindner.

I wish to express my appreciation to Dr. Ida A. Bengtson, of the National Institute of Health, and Dr. L. A. Julianelle of Washington University Medical School, for many critical suggestions. I am also indebted to Associate Professor C. J. Millar of the Missouri School of Mines for the photomicrographs.

Post Office Building.

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SYMPATHETIC OPHTHALMIA

Part I

ALAN C. WOODS, M.D.
BALTIMORE

This paper, which is a lecture given (by invitation) at the Postgraduate Course in Ophthalmology at the University of Rochester in New York, covers the important observations and views on this much-discussed subject. In it the author compares the data derived from the reports on this subject by Fuchs, Joy, and Verhoeff, and adds his own observations on twenty-eight cases, in fifteen of which the diagnosis was confirmed by histological study.

It will appear in two parts. In the first part are treated the history, definition, and incidence of the disease, its predisposing causes and the clinical picture in the exciting eye, the interval between injury of the exciting eye and onset of the disease, the clinical picture in the sympathizing eye, and the duration of the disease.

Causes other than penetrating wounds have induced the disease in seven authenticated cases observed by the writers whose data are tabulated for comparative purposes, among them one of his own. The type of trauma which the author regards as most grave in threatening sympathetic ophthalmia is the penetrating wound that involves the root of the iris or the ciliary region. The interval between injury to the exciting eye and onset of the disease in approximately 64 percent of the 129 cases discussed was under two months, and it appears that after three months have elapsed the chances for its development rapidly decline. However, assuming that no second injury has affected the exciting eye, it must be considered that long-delayed sympathetic ophthalmia is a clear-cut clinical entity. There is nothing characteristic in the exciting eye to point to a threatening of the second eye. In the author's opinion the salient characteristic clinically in the sympathizing eye is the massiveness and rather intermittent progress of cellular reaction in contrast to the low intensity of vascular and inflammatory reaction. From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital.

History

The first mention of possible sympathetic ophthalmia is in the anthology compiled by Constantius Cephalis, A.D. 1000, where in a quotation from Agathias, volume 11, page 352, is this observation: "The right eye when diseased often gives its suffering to the left." In 1583, Georges Bartisch, speaking of painful phthisis bulbi after injuries said, "In this case the other eye is in great danger." Throughout the next 300 years only occasional mention is made of the disease. In 1840 MacKenzie, in the third edition of his "Treatise on diseases of the eye," gave the first accurate description of the disease, and likewise gave to it the name it bears today. He regarded penetrating wounds of the eye, especially those involving the ciliary body, as the chief cause.

Definition

Sympathetic ophthalmia is a specific bilateral ocular disease, which usually occurs after penetrating wounds that involve the uveal tract of one eye, although rarely it may follow other causes. The injured eye is known as the exciting eye, and the uninjured eye as the sympathizing eye. The disease appears in the exciting eye at a variable time after injury and, synchronously or shortly afterwards, affects the sympathizing eye. The disease is confined primarily to the uveal tract. The clinical picture is fairly characteristic and the histologic picture is quite characteristic.

In defining the term "sympathetic ophthalmia," we should differentiate it sharply from "sympathetic irritation." This latter term is used to describe what is apparently a reflex disturbance in the second eye, after disease or injury of the first eye. This reflex disturbance is characterized by slight photophobia, lacrimation, and often transient amblyopia. Sympathetic irritation is rarely, if ever, the precursor of sympathetic ophthalmia.

Incidence of sympathetic ophthalmia

The older statistics on the incidence of sympathetic ophthalmia after injury, and the age and sex incidence are somewhat unreliable. A survey of the cases reported in the literature shows at once that many of the cases are probably not true sympathetic ophthalmia. Sufficient cases do not occur in any one clinic to afford statistical study, and it is diffi-

cult to draw conclusions from composite figures derived from many clinics, where individual differences in viewpoint influence the diagnosis.

As regards the general incidence of the disease, the only figures of value are those of Schirmer and Ohlemann and Theobald. These authors place the general incidence as 0.15 percent of all eye diseases. Of much greater clinical importance is the probability of the occurrence of sympathetic ophthalmia after penetrating wounds of the eye. Here the figures vary from a minimum incidence of 0.54 percent to a maximum of 5 percent.

Somewhat more accurate figures are available on the incidence with respect to age and sex, the nature of the injury in the exciting eye, the interval between injury and onset of the sympathetic disease, and other significant data. Fuchs lists 35 proved cases in which accurate statistics are available. H. H. Joy has recently made an excellent statistical study of the cases of sympathetic ophthalmia occurring in New York State in the last 25 years. All in all, he has collected 41 cases of the disease, the diagnosis of which has been proved by histological study. Verhoeff[4] has reported 35 cases in which accurate statistics are given. To these the author is able to add 28 cases, all personally observed, of undoubted sympathetic ophthalmia, the diagnosis in 15 cases having been confirmed by histological examination of the exciting eye.

Table 1 shows the age and sex incidence in these 136 cases. While it is generally supposed that young individuals are unusually susceptible to the disease, these figures, when compared with the age incidence of the general population, do not confirm this belief. While 34 percent of these cases occurred in individuals under 20 years of age, the age incidence of population under 20 years is 37 percent. It does appear to be more common in persons over 50 years of age, 28 percent of the cases occurring in this age group, while the age incidence of population in this group is only 17.3 percent. However, this is not conclusive, for individuals in the older group are more subject to operative wounds of the eye, and probably less subject to accidental wounds, the chief cause of sympathetic ophthalmia. Similarly, younger individuals are probably more subject to accidental wounds. Further, these figures indicate that males are over twice as susceptible as females, but again males would be more exposed to accidental and industrial injuries of the eyes. To determine accurately the age and sex susceptibility to sympathetic ophthalmia, we would require accurate statistics on the occurrence of accidental ocular wounds and intraocular operations in relation to age and sex. Such statistics are not available, and it does not seem justifiable, therefore, to assume from these figures that there is any especial age or sex susceptibility.

Table 1

AGE AND SEX INCIDENCE

Authors	0–11 yrs.	11–20 yrs.	21–30 yrs.	31–40 yrs.	41–50 yrs.	51–60 yrs.	61+ yrs.	Male	Female
Fuchs	4	5	6	5	3	5	5	26	9
Joy	7	3	9	3	3	7	8	28	12
Verhoeff	8	3	2	6	7	4	5	?	?
Woods	9	7	5	1	2	2	2	18	10
Total	28	18	22	15	15	18	20	72	31
Percentage	20.6	13.3	16.1	11.0	11.0	13.3	14.7		
Percentage of age incidence in the population	21.0	17.0	17.6	14.8	12.3	8.8	8.5		

Figure not available—Fuchs 2; Joy 1.

Predisposing causes in exciting eye

In his classical description of sympathetic ophthalmia published in 1840, MacKenzie emphasized that the preeminent cause of the disease is penetrating wounds of the eye involving the root of the iris and the ciliary body. The reports of Randolph, Schirmer, and of other writers on the disease have abundantly borne out the accuracy of this observation. Unfortunately, as before mentioned, the older statistics are somewhat unreliable, due to the questionable diagnosis of many of the cases listed. A study of the 139 cases of Fuchs, Joy, Verhoeff,* and Woods, however, seems to reflect fairly well the generally reported incidence of predisposing causes (table 2).

Table 2

PREDISPOSING CAUSES IN EXCITING EYE

Predisposing Cause	Fuchs	Joy	Verhoeff	Woods	Total	Percentage
Penetrating wounds	19	26	20	23	88	63.3
Cataract operations	4	5	7	2	18	12.9
Other intraocular operations	4	3	7	1	15	11.0
Subconjunctival, scleral rupture; nonperforating contusions (Joy)	2	4		1	7	5.0
Perforating corneal ulcers	3	1	1	1	6	4.2
Phthisis bulbi—after measles	0	1		0	1	0.7
Intraocular tumor	3	1		0	4	3.0

In this collected series, penetrating wounds of the exciting eye were the predisposing cause in 63.3 percent of the total number of cases. Intraocular operation was the exciting cause in 23.9 percent of the total number. Joy has called attention to the violence of the sympathetic inflammation after cataract extraction. This holds true in one of the two cases in the author's series. Fuchs reported that in three of his four cases that followed cataract extraction, the course was severe, and in the fourth case moderately severe.

Of especial interest are the cases of sympathetic ophthalmia following nonpenetrating wounds of the eye, such as simple contusion, subconjunctival scleral rupture, and disintegrating intraocular tumor. Harold Gifford has reported two undoubted cases of sympathetic ophthalmia following subconjunctival scleral rupture, there are three undoubted cases listed in table 2, while the four cases collected by Joy are listed as due to nonpenetrating contusions, and scattered similar cases have been reported by other observers. Likewise a number of cases of sympathetic ophthalmia have been reported following disintegrating intraocular tumor. Schirmer has collected 30 such cases; these Gifford has analyzed, admitting that eight of them are probably instances of true sympathetic ophthalmia. To these Fuchs has added three cases and Meller, one. The importance of these two predisposing causes will be stressed when we discuss the pathogenesis of the disease.

It has long been a point of common observation that sympathetic ophthalmia rarely, if ever, occurs when the injury in the first eye has been complicated by a purulent infection or panophthalmitis. So strongly was this belief held that for years, in the pre-Lister days, it was a common therapeutic procedure to induce suppuration in the lost, injured eyes as a prophylaxis against sympathetic ophthalmia. The early German investigators believed that the purulent infection destroyed the specific organisms which they believed to be responsible for sympathetic ophthalmia. H. Gifford believed that blockage of the lymph channels in the injured eye by the masses of leucocytes prevented the spread of the disease to the fellow eye. However, while this protection against sympathetic oph-

thalmia by suppuration in the injured eye is generally true, it is not absolute. Schirmer has reported two cases of sympathetic ophthalmia that followed injury and panophthalmitis in the exciting eye, and the author has seen one similar case.

Clinical picture in the exciting eye

Primarily, it must be emphasized that it is impossible to tell accurately from the examination of the exciting eye whether sympathetic ophthalmia threatens the second eye. While both the exciting and the sympathizing eyes show histologically an identical fundamental pathological process, the fairly characteristic picture in the exciting eye may be masked by the traumatic cyclitis. Clinical observation has taught us that wounds of the cornea, even when complicated by anterior synechiae, rarely, if ever, lead to sympathetic disease, and that purulent infection of the injured eye tends to protect the second eye.

There is one type of eye that is most to be feared as an exciting eye in the production of sympathetic ophthalmia. This is the eye that has suffered a penetrating wound involving the root of the iris or the ciliary region, in which there ensues a long-drawn-out, indolent uveitis with occasional exacerbations. Especially to be feared are such eyes with a tendency to phthisis bulbi, and recurrent ciliary pain. The persistence or recurrence of low-grade ciliary congestion, thickening and cellular infiltration of the iris, gradual formation of occlusio pupillae, and capsular clouding of the lens make up the usual clinical picture of sympathetic ophthalmia in the exciting eye. Yet the disease in the sympathizing eye may follow fast on a violent, acute, traumatic uveitis in the exciting eye. While we fear the indolent, recurrent, traumatic uveitis, with a tendency to phthisis, more than any other condition as a predisposing cause of sympathetic ophthalmia, nevertheless, it must be emphasized that there is nothing characteristic in the picture in the exciting eye, and that sympathetic ophthalmia may occur following a penetrating wound that is apparently healing without complications.

Interval between injury to exciting eye and onset of sympathetic ophthalmia

The interval between injury to the exciting eye and the onset of sympathetic ophthalmia in the second eye is extremely variable. The Nettleship report of 1886 gives the shortest interval as nine days and the longest interval as 20 years. Schirmer reports that in the cases collected by him the minimum interval between injury and onset of sympathetic ophthalmia was 14 days and the maximum interval 42 years. Randolph agrees with Schirmer that 14 days is the minimum interval reported in an undoubted case, and gives the maximum reported interval as 47 years. In many of these long-delayed cases the diagnosis is not certain, since frequently it has not been proved by histological examination of the enucleated eye. In the cases of Fuchs, Joy, Verhoeff,[4] and the author, charted in table 3, there are 13 cases of undoubted sympathetic ophthalmia in which the apparent interval between injury and the outbreak of the disease was over one year. If we can assume that there has been no second injury of the exciting eye, it would appear that long-delayed sympathetic ophthalmia is a clear-cut clinical entity (table 3).

In his series, Joy reported one case with a minimum interval of nine days, in the series of Verhoeff[4] and the author the shortest interval observed between injury and onset was 14 days, and the shortest interval reported by Fuchs was three weeks. Joy reported seven cases with the interval over five years, and in one case of proved sympathetic ophthalmia it was 48 years. Fuchs reported four cases in which the interval was from 9 to 20 years. I have observed only two cases in which the interval was over one year. In one of these the interval was 18 months, and in the other five years. In both of these patients, however, the exciting eye was not enucleated until the outbreak of the sympathetic disease.

However, it is apparent that in ap-

proximately 64 percent of the cases the interval is under two months. In Fuchs' series 73.3 percent, in Verhoeff's series 85 percent, and in Woods' series 81 percent of the patients observed showed an interval under three months. In the combined series 90 percent of the patients showed the interval between injury and onset of sympathetic ophthalmia to be less than one year. Certainly we are justified in the assumption that three months after injury, the chances of the development of sympathetic ophthalmia rapidly decline, and that the development of the disease one year after injury, while a possibility, must be regarded as a rarity.

Table 3

INTERVAL BETWEEN INJURY TO EXCITING EYE AND ONSET OF SYMPATHETIC OPHTHALMIA

Interval	Author and No. of Cases				Total	Percentage
	Fuchs	Joy	Verhoeff	Woods		
9 days	0	1	0	0	1	0.8
2–3 weeks	1	0	3	1	5	3.9
3 wks.–2 months	15	16	27	21	79	61.2
2 months–1 year	10	12	5	4	31	24.0
1–48 years	4	7	0	2	13	10.1

No information—Fuchs 5, Joy 5.

Clinical picture in sympathizing eye

The tendency of the older writers on sympathetic ophthalmia was to subdivide and classify the disease according to the predominating symptoms exhibited by the various cases observed. Thus Randolph, in 1898, speaks of sympathetic plastic iritis, sympathetic serous iritis, and sympathetic papillo-retinitis almost as different clinical entities, with respectively better prognosis in the three conditions. Schirmer, in 1905, carried this classification still further, and described sympathetic fibrinous uveitis, sympathetic serous uveitis, sympathetic papillo-retinitis, sympathetic atrophy of the nerve, sympathetic cataract, sympathetic detached retina, and sympathetic conjunctivitis, keratitis, and scleritis. There is also no uniformity of opinion among the older writers as to the most characteristic manifestations of the disease. Hirschberg believed the most characteristic finding to be small, white spots in the periphery of the fundus. Mooren, as early as 1869, emphasized and described with exceeding accuracy the characteristic rigidity of the iris tissue and the inability either to dilate the pupil or to secure a broad iridectomy by operation. He described a "felting of the uveal tract into a rigid mass." Randolph, in 1905, described as characteristic symptoms the absence of pain, the insidious onset, the early failure of vision, the small amount of inflammatory reaction in the early stages, and the tendency to exacerbation. Gifford repeated essentially the same description of the disease as that given by Randolph, but apparently agrees with Hirschberg and other later authors that the most characteristic sign is the small, yellowish, yellowish-red, or white spots about one-fifth disc diameter in size, appearing towards the middle and outer periphery of the eye.

With the advance in medical knowledge, the recognition of other ocular disease entities, which earlier were doubtless confused with sympathetic ophthalmia, and especially with the revelation of the characteristic histologic picture of sympathetic ophthalmia, we are able to consolidate the various subdivisions of the disease described by the older authors, and to recognize a rather characteristic clinical appearance which coincides closely with the histologic picture.

Nevertheless, the accuracy of many of the older observations is astounding.

We would have difficulty in describing the changes in the iris better than did Mooren in 1869; and Randolph's description of the disease, when he speaks purely from his personal observations, is classically accurate.

To my mind, the salient characteristic in the clinical picture of sympathetic ophthalmia is the massiveness and rather intermittent progression of the cellular reaction in contrast to the low intensity of the vascular or inflammatory reaction. Primarily, we may recognize two different clinical manifestations of sympathetic ophthalmia, which for want of better terms may be called the anterior and posterior forms of the disease, depending on whether the anterior or posterior uvea is primarily attacked. Yet, whether the morbid process begins in the iris and ciliary body on the one hand, or in the posterior choroid with secondary changes in the retina and optic nerve on the other hand, the usual course of the disease is to spread slowly to the unaffected portions of the uvea, producing finally a nearly identical picture.

The changes in the anterior uvea are characterized by an insidious onset, the early picture being that of a low-grade iritis associated with visual failure and absence of pain. Periods of acute exacerbation of the inflammation frequently occur. The iris gradually becomes lusterless and thickened, new vessels appear, and there is early capsular clouding of the lens. Associated with this are deposits on the posterior corneal surface, and an increased cellular content of the aqueous, with a positive ray on slitlamp examination. Later in the disease, usually after two months or longer, a characteristic change appears. The pupillary margin of the thickened iris, bound down completely by posterior synechiae, appears to become confluent with the thickened and semiopaque lens capsule, and small capillaries from the iris run over the infiltration on the lens capsule and appear to invade the anterior capsule of the lens. Frequently, rather large, flat nodules develop in the thickened iris, usually in the central or inner portion. The media of the eye are usually clear at the onset, but small opacities rapidly appear in the vitreous and then generalized vitreous turbidity occurs. There is an early subretinal edema, and the optic nerve is at first congested and red. As the lens capsule clouds, and the vitreous becomes more turbid, all the fundus details are lost. With the formation of posterior synechiae, the intraocular tension usually rises gradually and the eye passes into a secondary glaucoma of varying intensity and duration. If the disease is not controlled in this stage, or earlier, the glaucoma usually persists for a period of several months, then with the formation of a complete cataract and often seclusion of the pupil, the eye gradually passes into a lower tension and usually into phthisis bulbi.

In the posterior form of the disease the onset is radically different. While there are early disturbances of vision, there is at first an absence of iritis. The media are clear, but examination of the fundus shows a generalized subretinal edema in the posterior pole of the eye, associated with swelling and congestion of the optic nerve. The small exudates described by Hirschberg, Haab, Gifford, and others, appear towards the center of the periphery of the fundus. Frequently there are sharp changes in the refraction, in the form of a temporary hyperopia, which are probably due to the increased thickness of the choroid. The vitreous very rapidly becomes hazy, and the morbid process advances to the anterior uvea with the characteristic changes in the iris already described, and the capsular clouding of the lens. Thereafter there is little difference in the picture. In the cases of sympathetic ophthalmia where the posterior uvea was first attacked, glaucoma appeared relatively early in the disease. This is probably due to the increased protein content of the intraocular fluids, associated with an absence of congestion of the anterior ocular segments.

A straight sympathetic papillo-retinitis, without tendency to spread to the surrounding uvea, and invariably permanently relieved by enucleation of the exciting eye, is described by the older

authors. It is difficult to believe this can be an entity in sympathetic ophthalmia. It is probable these early observers confused as a sympathetic phenomenon a unilateral optic neuritis, due to some other unknown cause.

The changes in the cornea consist in posterior corneal deposits with later interstitial edema and secondary changes. However advanced they may be, they must be regarded as secondary to the underlying uveitis.

The sclera is undoubtedly involved at times in the specific process, yet clinically we see little evidence of an actual scleritis.

Duration of the disease

Sympathetic ophthalmia is essentially a chronic, long-drawn-out disease. Undoubtedly one occasionally sees definite, proved cases that run an extremely mild and short course. Fuchs recorded 2 such cases in his series. Joy reported that in 9, or 22.5 percent, of his collected cases, the course was definitely mild, and in my own series the disease in 6 of the 28 patients ran a mild course.

In spite of these mild cases, the disease must be regarded as an essentially chronic one, with a marked tendency to relapse. There are no available statistical studies on the actual duration of the disease. The patients frequently disappear from observation, with the eyes lost and the disease still active and undergoing exacerbations of inflammation. In Joy's series only 11 of the 41 patients were reported as having a duration of less than three months. An analysis of the healed cases reported by Verhoeff shows that the average duration of the disease in 27 such patients was a little over ten months, taking into account the influence of treatment. A similar analysis of the 12 healed cases in the author's series showed the average duration of the disease to be nine months, irrespective of the time of institution of treatment. The duration of the inflammation in the cases that progress to blindness must be estimated as well over one year.

The disease is characterized by short periods of remission of the acute inflammation and sharp exacerbations. Verhoeff reports as many as eight exacerbations over a period of observation of eight years, the patient still being under treatment with the maintenance of excellent vision. He reports a second case with three exacerbations in one year.

The clinical picture, therefore, may be summarized as follows: The onset is insidious, visual failure is early, and either the anterior or posterior uvea may be involved first, usually the former. The disease is long drawn out and subject to repeated exacerbations. The entire uvea is soon involved, the iris becoming greatly thickened, the pupil immobile and intractable to mydriatics. Nodules may form on the iris. Posterior synechiae are the rule, with capsular clouding of the lens and later cataract formation. The iris and lens capsule become almost confluent, with vessels from the iris invading the pupillary membrane. Secondary glaucoma occurs, which may last for months, finally subsiding, and the eye usually goes into phthisis.

(Part II will appear in the February issue.)

BULLOUS KERATITIS: A RATIONAL THERAPY

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The surgical removal of Bowman's membrane in two cases of bullous keratitis permitted permanent adhesion of new-formed epithelium to the substantia propria. In one case enucleation was avoided. Thus clinical evidence tends to support Ewing's and Allen's view that the essential cause of bullous keratitis is a disease or alteration of Bowman's membrane. Read before the meeting of the American Ophthalmological Society, at Hot Springs, Virginia, June 5-7, 1935.

My interest in the subject of bullous keratitis was aroused by a perusal of Dr. Thomas D. Allen's[1] thesis "On the Pathology of Bullous Keratitis." Based on a histologic study of a large number of sections from various sources, Allen reached the conclusion that "the essential pathology of bullous keratitis is some unknown change in Bowman's membrane which interferes with its giving a foothold to the epithelium and often to the connective tissue which grows between them." Allen adds that "the treatment should be directed to the cause of the primary condition, after which, if the bullae persist in forming, the Bowman membrane in that region should be carefully removed."

The view that alteration or disease of Bowman's membrane was primarily responsible for the formation of bullae in glaucomatous eyes was advanced by Ewing[2] in 1904. As Allen states that Ewing's paper did not come to his attention until after he had completed his thesis, the almost identical conclusions of these authors is interesting. Should Allen's conception of this clinical entity—it can hardly be styled a disease—receive confirmation by subsequent investigators, the work of Ewing, which has been essentially ignored by subsequent writers, would have great historical interest. It seems worth while, therefore, to summarize Ewing's paper in some detail:

His patient suffered from secondary glaucoma. The anterior chamber was shallow, the iris bombé and vascular, with cholesterin crystals on its surface; the pupil was moderately dilated, the lens semitransparent. A vesicle 2½ x 3 mm. extended from the center of the cornea downward. The globe was removed.

Histologic examination revealed the usual changes in the nerve, retina, and choroid of a degenerated glaucomatous eye. The endothelium of Descemet's membrane was absent. The posterior layers of the cornea were essentially normal; the central and anterior layers showed interlamellar spaces that were "wider than normal." Quoting Ewing, "Bowman's membrane had been destroyed in several places and filling each of these perforations besides extending variable distances between the membrane and the epithelium was a layer of thin fibrous tissue of varying width and sometimes vascular upon which rested the basal cells of the epithelium. In an area of from 3 to 4 mm. near its center the *membrane was undergoing fatty degeneration as shown in the osmium stained sections.*" (Italics mine.) Serial sections showed that the epithelium was continuous over the whole vesicle "except for a space of about ½ mm. near its center but in many places it was thickened and elevated from Bowman's membrane."

Again quoting Ewing, "While the cause for this form of degeneration must be attributed to lack of nourishment due to the generally diseased condition of the globe, the character of the change and its confinement to the anterior limiting membrane may explain both the formation of the vesicle and the liability to frequent relapses." He concludes as follows: "Bullous keratitis attendant upon advanced glaucoma is not primarily an affection of the epithelium but a form of necrosis of the anterior limiting membrane in the destruction of which the epithelium is forced to take part. . . . As only the anterior limiting membrane seems primarily to have been involved, it is not unreasonable to infer that a similar

condition may exist in other forms of indolent superficial keratitis, and this may explain the tardiness which accompanies the recovery from such lesions."

Probably the first recorded case of bullous keratitis (as stated by Allen) is contained in the appendix of a book of lectures by Bowman at Moorfield's Hospital in 1847-9. It occurred in a patient suffering from absolute glaucoma. The description is perfectly characteristic of the clinical picture of bullous keratitis. Bowman adds, "This affection seems a consequence of general impairment of nutrition of the organ and not of any inflammation in the cornea which is quite transparent." It is a tribute to the keen clinical acumen of Bowman that he regarded this affection as an incident in the later stages of some ocular disease characterized by degenerative changes, a view which has, in the main, been confirmed by subsequent observers.

A picture of the changes in the cornea would be a composite of the findings of the relatively few investigators who have interested themselves in this subject. It should be recalled that no example of the milder forms of the malady has been studied histologically for the very obvious reason that such eyes do not require removal. In an eye in which the bulla is but an incident in the general disorganization of the globe, it is not possible to be dogmatic with reference to the relation of certain changes to the underlying condition or to the corneal manifestation.

Endothelium membrane. The endothelium has been found considerably altered. The cells are flattened and farther apart. Sometimes, according to de Schweinitz and Shumway[3] "spaces the width of the cells intervene in places between adjoining cells." Ewing found the endothelium absent.

Substantia propria. The corneal lamellae are often separated, and are sometimes distorted and irregular. Capillaries have been found in the middle layers. The corneal corpuscles are flattened and stain poorly. A connective-tissue infiltration has been noted in some cases.

Bowman's membrane. The normal passages have been found enlarged, thus permitting penetration of epithelial cells. The membrane has been found split, with cells occupying the clefts. Other specimens show deep concavities with cells lying in the hollows. Frequently there are gaps in which the membrane is entirely absent. Fatty degeneration has been demonstrated by Ewing.

Epithelium. In the early stages there is a shrinkage of the basal cells with the appearance of an intercellular bridge work which may extend to a "footplate" (Allen) which lies on Bowman's membrane. Later there occurs intercellular edema, the nuclei being surrounded with vacuoles. Connective-tissue cells are sometimes found between Bowman's membrane and the epithelium.

De Schweinitz and Shumway noted especially changes in the shape of the basal cells, the normal columnar cells being replaced by distorted polygonal cells, and were inclined to think that these misshapen cells could not gain a foothold on the membrane. They observed also the interposition of a homogeneous Bowmanlike membrane between the epithelial layers—an appearance noted by nearly all investigators.

The term "bullous keratitis" should be confined to cases in which the bulla or bullae form a fluid-containing sac which may be altered in shape by pressure, and should not be applied to the minute vesicles which occur, for instance, in herpetic keratitis. Histologically, also, there are points of difference.

Whence comes the fluid in the vesicle? Is it aqueous which has been forced by increased intraocular pressure through the altered or diseased endothelium of Descemet's membrane to waterlog the substantia propria, and thence by way of the widened canals in Bowman's membrane to occupy the space beneath the epithelial sheet[2]? It is an accepted fact that the normal

membrane of Descemet is impermeable to fluids, so that the foregoing theory would have to be rejected in explanation of bullous formations in eyes that are not glaucomatous and give no evidence of disease of Descemet's membrane.

In Allen's opinion "the cause of formation of vesicles is an unsolved problem. Evidently it is a physico-chemical change bound up in the metabolism of the cells themselves."

The drawings and photomicrographs illustrating Allen's thesis give a very complete picture of the different stages and aspects of bullous keratitis. One feature above others is strikingly exemplified in many sections; viz., that wherever Bowman's membrane has wholly disappeared the epithelium implants itself upon the substantia propria and adheres with as much, if not greater, tenacity than it did to normal Bowman's membrane. When new-formed connective tissue is formed above Bowman's membrane a firm adhesion takes place between it and the epithelium.

This feature is frequently found in the drawings of sections of other investigators, but no particular stress has been laid upon it, either as illustrating the important role of Bowman's membrane in the formation of the bulla, or as a finding suggestive of a rational therapeutic procedure. It is to Allen's credit that he deduced from the pathologic picture a practical method of dealing with many cases of this intractable malady.

That there may be a type of bullous keratitis amenable to indirect methods of treatment is suggested by three cases reported by Griscom[4]. In two of his patients there were no glaucomatous symptoms, and the bullae promptly and permanently disappeared following evacuation of pus from the nasal sinuses. In each the sinus on the side corresponding to the affected eye was involved. In his third case there was an elevation of tension, and, despite vigorous treatment with tincture of iodine and the cautery, bullae continued to form. Even iridectomy did not give relief. Treatment of a purulent ethmoiditis effected a permanent cure.

Reports of direct treatment of bullous keratitis are infrequent. Methods which have proved successful have led the authors to congratulate themselves and to put their cases on record. In most of these successful cases, either the actual cautery or a strong chemical caustic has been used. In Arnold Knapp's[5] case, the removal of the wall of the bleb together with nearly all of the loosened corneal epithelium and the application of one-percent silver nitrate did not, primarily, effect a cure. Repetition of the treatment three weeks later led to superficial infiltration of the cornea in the upper half and finally to permanent healing. It is clear from Knapp's description that no attempt was made to remove Bowman's membrane. It is suggested that the failure to heal after the first application of silver nitrate was due to insufficient cauterization but that the second application was more vigorous and resulted in the destruction of Bowman's membrane, thus permitting the newly formed epithelium to adhere to the upper layers of the substantia propria.

An early reference to the treatment of bullous keratitis is that by W. R. Parker[6]. His patient had a bullous keratitis following a scratch of the cornea. Excision of the bleb was followed by reformation. After the galvanocautery was lightly applied there was a return of pain and bleb formation. A second application of the cautery resulted in a proliferation of epithelium and cure, there being no return of the blister four months after the last cauterization. Again it is suggested that the reason for cure was the final destruction of Bowman's membrane.

W. T. Davis[7] has recently reported the cure of an inveterate bilateral bullous keratitis by means of frequent applications of the X ray.

Bullous keratitis, as stated above, is usually an incident in the course of degenerative disease of the globe. It frequently occurs in a totally blind eye or in an eye tending inevitably to blindness. It is not surprising, therefore, that ophthalmologists have been little interested in any means of therapy directed solely toward eradicating the

bulla and possibly preventing its recurrence. Many of these eyes, painful from an old iridocyclitis which may have eventuated in secondary glaucoma, seem to demand removal. Any less radical measure may appear to be a waste of time, and both ophthalmologist and patient may not have the patience to submit to a long course of treatment which will not restore vision. Thus the Gordian knot is cut, and the eye removed.

Case Reports

Case 1. L. H., male, aged 19 years, came under observation July 29, 1932. He stated that eight years previously his right eye had been struck by "a glancing bullet." The accident occurred while he was in a shooting gallery. Later a cataract developed. The eye, though sightless, had given no trouble until recently when it became very painful.

X ray showed the presence of a foreign body about 2 x 1 x 1 mm. located 2 mm. above the horizontal plane of the cornea, 3 mm. to the temporal side of the vertical plane of the cornea, and 7.5 mm. behind the center of the cornea. Application of the magnet produced no pain reaction, so it was assumed that the fragment was nonmagnetic. Vision was light perception with good projection. There were dense cataract and some synechiae. A large bleb occupied the lower third of the cornea. This was punctured with a hypodermic needle, followed by the application of an ointment containing epinephrine and holocaine. Later a salve containing hyoscine and holocaine was used. The eye was bandaged. Two weeks later the eye was white and the corneal surface did not take the fluorescein stain. Three weeks later two bullae close together appeared at the site of the former single bulla. The same treatment was followed by apparent recovery. A month later the cataract was removed by Barkan's technique. The operation was difficult, requiring the introduction of scissors into the anterior chamber to divide several firm bands of adhesion. Recovery was satisfactory, and vision with +10 D. sph. was improved to 6/50.

Six weeks after the operation, two bullae appeared, accompanied by pain. The patient was readmitted to the hospital and a corneal dissection of the entire area involved in the bullae was performed. The defect was promptly covered by epithelium. The patient was seen at intervals for six months and there was no return of the bullae.

Case 2. O. H. K., male, was seen in 1909, at the age of 47 years. Always nearsighted, he had observed failing of vision in the right eye seven months before. There was a history of injury (snowball) to the right eye in boyhood.

O.D. dense cataract. Projection good.

O.S. faint diffuse posterior capsular haze; tiny radii of opacity at lower pole of lens. Pigmentary changes at the macula.

O.S. —13 D. sph. ⊂⊃ —4 D. cyl. axis 15°, V = 6/12.

In 1910 the right lens was extracted (extra capsular) after preliminary iridectomy. After discission, O.D.V. = 6/16 with +1.5 D. sph. ⊂⊃ +1.5 D. cyl. axis 20°.

In July, 1932 (twenty-two years later), the patient reappeared. Three weeks previously while stooping down he had struck his left eye against the corner of a desk. There was little pain at the time but vision was much diminished. (There had been some visual failure in this eye prior to the accident.) Pain, increasing in severity, had been present for two days. There was intense ciliary congestion, the cornea was steamy, the chamber deep, the iris tremulous, the lens cataractous. V = p.1; tension, 47 (Schiötz). Two instillations of suprarenin bitartrate 1 percent increased the tension to 65 (Schiötz).

The patient was admitted to the hospital. His physician stated that he had had a chronic nephritis and diabetes for several years. Under eserine and pilocarpine drops and hot packs the eye rapidly quieted, and on discharge four days later, the tension had dropped to 16½ (Schiötz). There was no increase in vision.

The patient remained free from symptoms to February, 1934, when the left eye again became painful. He did

not consult me until March 4th. The condition was similar to that two years previously, and in addition there was a typical bulla occupying the pupillary space and extending downward. V = 0. Miotics failed to lower the tension which was 64 (Schiötz). Local treatment: pantocaine one-half percent, an ointment containing epinephrine and holocaine, and dry heat (Altherm) gave only temporary relief. The bulla ruptured spontaneously. After a month of ineffective treatment the tension remained high and a second smaller bulla had developed to the temporal side of the original one. Enucleation was suggested, but strongly objected to by both the patient and his wife. Dr. W. E. Shahan who saw the patient with me concurred in this opinion.

On April 8th, the entire area covered by the two bullae was carefully removed, care being taken to carry the dissection into the superficial lamellae of the cornea. (For this purpose I found Tooke's round-ended knife very satisfactory.) The cornea was not perforated. The conjunctival sac was filled with merthiolate ointment 1/5000 and bandaged. The following day the patient expressed gratitude at the relief of pain. Improvement was continuous. By April 20th, the denuded area had been wholly covered by new-formed epithelium. The bulla did not reform despite the continuance (for a time) of high intraocular pressure. The latter finally yielded to treatment (hot packs, eserine ointment one-fourth percent, and several paracenteses), pain ceased, the eye whitened and could be held open without difficulty.

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ON THE SURGERY OF GLAUCOMA: MODE OF ACTION OF CYCLODIALYSIS

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By means of an improved method of slitlamp microscopy of the angle of the anterior chamber in the living, the authors have studied fourteen cases of glaucoma before and after operation with cyclodialysis. They conclude that the success of this operation depends upon the establishment of a cleft or permanent communication between the anterior chamber and the suprachoroidal space. Definite surgical conclusions are drawn. Read before the Pacific Coast Oto-ophthalmological Society, at Portland, Oregon, June, 1935.

E. Fuchs's[1] observations of hypotony associated with choroidal detachment following cataract extraction suggested to Heine[2] the thought of similarly softening the glaucomatous eye by establishing a communication between the anterior chamber and the suprachoroidal space through surgical means. He was encouraged in his idea by the knowledge, as shown by anatomical specimens, that in absolute glaucoma, with complete obliteration of the filtration angle, the suprachoroidal space remains patent for a long time, perhaps permanently so. He hoped that as in traumatic iridodialysis the healing ciliary body or iris root usually shows no tendency to readhere, the surgically detached ciliary body would also remain detached during the healing process, and that thus a permanent communication between the anterior chamber and the suprachoroidal space would be established; or that, with the help of a miotic, at least a capillary cleft would remain which would be sufficient to permit outflow of aqueous into the suprachoroidal space.

Heine's original idea has been supported by several facts. Thus, in some cases after cyclodialysis, a flat peripheral choroidal detachment has been observed with the opthalmoscope. It seemed questionable to him, however, whether the permanency of its action could be explained in this way. In cases of this nature that have come to anatomical examination because of failure to control tension, a reattachment of the iris root is, of course, found. But what of the many successful cases that constitute the majority? One such has been examined anatomically, that of Elschnig.[3] Histological examination of the eye, the tension of which had been permanently normalized by cyclodialysis 14 years previously, showed a free angle, patent Schlemm's canal, and a communicating cleft between the anterior chamber and the suprachoroidal space within the area of operation. On the opposite, nonoperated-on, side the angle was closed and Schlemm's canal mostly obliterated. Elschnig believes the formation of the cleft to have been the major agent in reducing the tension in this case. He does not, however, exclude reduced production of aqueous, resulting from damage to the ciliary body, as a possible factor. Moreover, he does not believe the freeing of the angle to have been a factor, because the pectinate ligament (corneoscleral trabeculum) within this region appeared so sclerosed and compressed as probably to have rendered filtration impossible. This case, then, shows that the success of the operation *may* depend upon a communication between the anterior chamber and the suprachoroidal space.

Some authors believe that the improved circulation within the iris vessels—these vessels, bent at right angles by the peripheral iris adhesions, are straightened out by the operation—affords the opportunity for increased absorption of aqueous. Filtration through the scleral scar does not come into question. Others suggest that a restitution of the filtration angle by separation of the peripheral iris adhesions from the angle wall, or scraping off the pathological endothelium in the angle with subsequent regeneration when the ciliary body heals on again is a factor. Heine regards this as a possibility but remarks that it would

be difficult to demonstrate anatomically and to disprove the presence of a capillary cleft in the region of the cyclodialysis. Other theories deal with the thought of reduced formation of aqueous through atrophy of the ciliary body following section of its nerves and vessels of supply (R. Salus,[4] Kraus,[5] and Meller[6]). According to E. Bunge,[7] such a partial atrophy of the ciliary body that already shows some general atrophy, due to the glaucomatous process, cannot be accepted as proved.

We, therefore, do not as yet possess a positive anatomical explanation of the action of cyclodialysis and must still content ourselves with the discussion of theories such as the ones mentioned above.

The mode of action of cyclodialysis remains, therefore, an open question to date. The importance of arriving at the true explanation of the action of the operation is evident. Our surgical technique as well as the indications for operation and choice of case would probably be materially influenced and improved by the knowledge of what we are trying and are able to achieve.

It was with this purpose in mind that we examined the angle of the anterior chamber of a series of cyclodialized eyes with the Koeppe contact glass, Vogt arc slitlamp, and the binocular corneal microscope. The method which we have devised will be published in the near future.[8, 9] For the present, let it suffice to state that with this technique a truly beautiful picture of over 40 magnifications of the whole circumference of the angle and its constituent parts can be obtained, such as has not been afforded by any of the gonioscopic methods used up to the present time.

With this method we have examined to date 14 cases of primary glaucoma in which operation by cyclodialysis had been performed. Of the 11 cases in which the operation successfully normalized tension, all showed a detached iris root and a cleft between the iris root and the scleral wall. Through this cleft or aperture one can see the scleral wall and is sometimes able to look into a cavern extending 6 mm. or more posterior to the scleral spur. The farther reaches of this apparently bottomless pit are lost to view. Figure 1 depicts an example of such a case. This as well as the other figures gives a diagrammatic composite view of what is seen in different lines of regard. Figure 1 illustrates the case of Mr. L., aged 62 years, who had chronic simple glaucoma, with a preoperative tension of 58 mm. Hg. (McLean), while under the influence of three-hourly instillations of 2-percent pilocarpine. Cyclodialysis (down and out) performed three years ago had successfully normalized tension (under 30 mm., McLean) to date. The operation formed the cleft (at 5) and, as is usually the case, caused some traumatic peripheral iris adhesions (at 4) on each side of the cleft. The angle is open throughout the rest of the circumference, there having been no preoperative peripheral iris adhesions.

Of the 14 eyes, all that were successfully operated on show this characteristic picture of a surgical cyclodialysis or detachment of the iris root together with a communication between the anterior chamber and the suprachoroidal space. The three unsuccessful operations, on the contrary, all resulted in a reattachment of the iris root to the scleral wall. After a second operation in one of these cases, there was formation of a dialysis or cleft, and the tension was successfully normalized. Of the remaining two patients, one was later successfully operated on with iridencleisis and the other was not subjected to reoperation, as the tension had remained nearly normal, function had been retained to date, and the patient was adverse to further surgery. It may be mentioned, incidentally, that the site of reattachment in the unsuccessful cases was more often than not posterior to its original anatomical attachment, constituting a retroplacement of the iris root. Inasmuch as in these latter cases absence of communication between the anterior chamber and the suprachoroidal space was a constant finding, this would seem to be the reason for the failure of the operation to reduce ten-

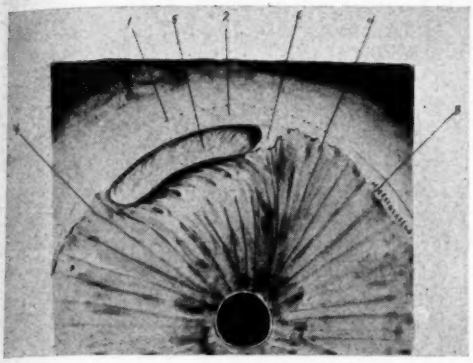

Fig. 1 (Otto Barkan, Boyle, and Maisler). Diagrammatic, composite view of the anterior-chamber angle in case 1. 1. Internal annular ring of Schwalbe. 2. Angle wall. 3. Normal insertion of iris root showing iris processes. 4. Peripheral synechiae (adhesions of iris root to angle wall as result of operation). 5. Cleft showing inner surface of sclera. 6. Piece of membrane bridging over cleft.

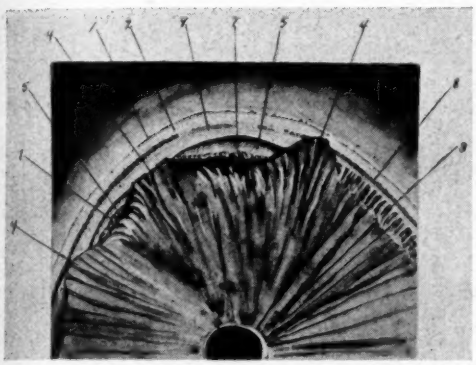

Fig. 2 (Otto Barkan, Boyle, and Maisler). Diagrammatic view of the angle following the first operation in case 2. 1. Internal annular ring of Schwalbe. 2. Angle wall. 3. Normal insertion of iris root showing iris processes. 4. Peripheral synechiae (adhesions of iris root to angle wall as result of operation). 5. Cleft showing inner surface of sclera. 7. Reattachment of iris root to sclera. 8. Pores of corneoscleral trabeculum covering Schlemm's canal stopped with pigment granules. 9. Pigment-stained Schlemm's canal exposed to view; trabecular pigment granules have been scraped off by the spatula.

sion. The following case history serves as a good example of this:

Case History

Mrs. H., aged 62 years, with a hypertension of the left eye (65 mm., McLean) which was normalized by a cyclodialysis operation (below and out) for eight months, experienced a return of hypertension which gradually increased. Examination showed (fig. 2) the characteristic cleft or aperture between the scleral spur and iris root (at 5).

However, after prolonged examination, we discovered that in healing the iris root had become attached to the scleral wall 2 or 3 mm. behind its original anatomical insertion (at 7). The diagram represents a composite picture of what is seen at different angles of regard and shows the dialysis and the site of the reattachment of the iris root. A second cyclodialysis was performed, up and out, with an immediate reduction of tension which has persisted to date (ten months). The second cyclo-

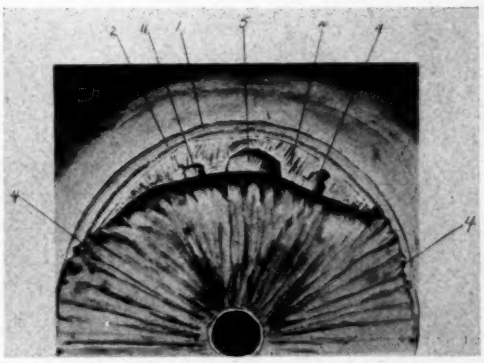

Fig. 3 (Otto Barkan, Boyle, and Maisler). View of the same eye as in figure 2 after second operation. 1. Internal annular ring of Schwalbe. 2. Angle wall (up and out). 4. Peripheral synechiae (adhesions of iris root to angle wall as result of operation). 5. Cleft showing inner surface of sclera. 10. Membrane bridging over cleft. 11. Fenestrations of membrane, permitting communication between the anterior chamber and the suprachoroidal space.

dialized region shows a characteristic cleft extending from the anterior chamber to the suprachoroidal space as illustrated in figure 3.

Here the cleft is not completely open, as in the case illustrated in figure one, but is bridged over by a very thin membrane (at 10) which, however, is incomplete, and through its fenestrations (at

11) one can see the scleral wall (at 5) and look into the suprachoroidal space, showing that there is a definite communication.

Figure 2 shows the trabeculum covering Schlemm's canal to have been scraped clean by the spatula. That this could not have been an active factor in reducing tension is proved by the recurrence of tension when the cleft closed—the rest of the picture remaining unchanged.

Surgical conclusions. In the 14 cases of primary glaucoma examined to date, tension was normalized in all those in which the characteristic surgical dialysis, as shown in figures 1 and 2, was established. In those cases, on the other hand, in which the iris had become reattached (reattachment to the original insertion or retroplacement) there was no reduction of tension, or the effect was transitory and lasted only so long as the communication remained open. The disposition to closure we have found to be due to the dialysis' being too small in extent, thus favoring adhesions of the contiguous surfaces, or to trauma during operation which creates raw surfaces and stimulates healing of the surfaces through exudation, and so forth. Thus, for instance, at the points where Descemet's membrane had been traumatized by the spatula, peripheral anterior-iris adhesions are seen to have formed, counteracting the very object of the operation. Trauma encourages exudation and formation of iris adhesions in the angle just as it induces posterior adhesions of the pupillary border of the iris to the lens, more especially in that sector of its circumference which corresponds to the sector of the iris that has been dialyzed. The tendency to exudation and formation of adhesions seems also to vary with the individual.

Successful achievement of a permanent dialysis is favored by the following factors: 1. separation of the ciliary body with the spatula through a sufficiently large portion of the circumference (two fifths to one half); 2. reduction of trauma to a minimum.

These objectives are promoted by making the scleral incision farther posterior and even more diagonal than is customary, thereby facilitating entrance of the spatula in the tangential plane and also its rotation through a large arc. Perhaps, also, the rapid closure of the diagonal valvelike incision favors reëstablishment of the anterior chamber and thus tends to promote the maintenance of the cleft by keeping its surfaces apart. As we believe that loss of aqueous and hemorrhage into the anterior chamber tend to encourage reattachment of the dialysis, we feel that one should attempt to preserve the anterior chamber and prevent hemorrhage. Retrobulbar injection of one cubic centimeter of novocaine with an extra drop of adrenalin, avoidance of vessels during the approach, complete hemostasis at the site of incision by means of adrenalin wicks and if necessary by touching the bleeding point with the actual cautery, and immediate application of pressure after removal of the spatula will in large measure prevent hemorrhage into the anterior chamber even in inflamed, very hard, chronic glaucomatous eyes, operated on under gas and oxygen.

We have noticed that such slight amount of blood as has appeared in the anterior chamber has been of venous color. We believe that in part it was sucked in from the conjunctival wound and that there is never occasion for arterial hemorrhage unless it be in the case of marked general vascular disease with arterial degeneration. Even in these instances we cannot but think that it is avoidable. Furthermore, in our opinion, postoperative instillation of mydriatics, which is advised as a routine procedure to prevent formation of pupillary synechiae, should be avoided whenever possible and especially in cases of shallow anterior chamber. It will be found that if the operation is performed with sufficient lack of traumatism, immediate mydriasis is often not necessary. Mydriasis, we believe, may favor closure of the dialysis by approximating the base of the iris to the site of its previous insertion, and in cases of very shallow chamber may also occlude the rest of the angle along with the cyclodialyzed

part, as we have had occasion to observe, and precipitate an acute attack of glaucoma. We have further found that when the dialysis cleft is very great in extent, hypotony is apt to ensue with gradual cataract formation or acceleration of an incipient one.

Theoretically, the question may be asked whether the dialysis acts by disturbing the function of the ciliary body through severance of its nervous and vascular supply, with consequent atrophy and reduced production of aqueous, or whether it acts by permitting outflow of aqueous through the cleft into the suprachoroidal space where it is absorbed. As a result of our observations, we cannot but believe that the question must be answered in the latter sense. In every case of cyclodialysis, the operation has severed the same nerves and vessels and has cut off the ciliary body from its supply whether successful in reducing tension or not, whether establishing communication between the anterior chamber and the suprachoroidea or not, whether or not causing permanent dialysis. In those cases which showed the dialysis, tension was always found to be reduced. The reduction of tension was immediate (that is, within twenty-four hours and before atrophy could have developed) and remained so. In the unsuccessful ones tension was either not reduced at all or after initial reduction became increased after a time, when it was found that the ciliary body was reattached. The only difference between the successful cases and failures would then seem to be that in the former a dialysis or cleft persists whereas in the latter reattachment occurs.

Summary

Our gonioscopic investigations show that the establishment of communication between the anterior chamber and the suprachoroidea is the mechanical *sine qua non* in the successful action of cyclodialysis in cases of primary glaucoma observed by us. This is of evident surgical and clinical importance. In practice, the method has the added advantage of enabling us to determine the reason for lack of effect of the operation in a given case and of indicating when a repetition of the operation is necessary in order to establish the permanent dialysis which insures a successful result.

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THE KAYSER-FLEISCHER RING IN WILSON'S DISEASE AND MICROCEPHALY

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The Kayser-Fleischer ring found in Wilson's disease is probably not so rare as is commonly believed, for the four cases reported were seen during a period of nine months. Three of these were unquestioned cases of Wilson's disease though none of the patients had an enlarged liver or impaired liver function. The fourth case was that of an eight-year-old girl with microcephalus, whose brother's case of Wilson's disease is reported in the series. In no case thus far reported has the Kayser-Fleischer ring been observed in so young a patient nor has it ever been previously found associated with microcephalus. This child had evidence of pyramidal disease and may yet develop the true Wilson's symptom complex. The presence of the ring in so young a patient would indicate that it does occur early but escapes notice until the disease has advanced to the point where a diagnosis of lenticular degeneration can be made. From the Division of Ophthalmology, Department of Surgery, The University of Chicago, E. V. L. Brown, Director. Read before the Chicago Ophthalmological Society, May 13, 1935.

Wilson's disease is a rare neurological condition about the etiology of which little is known. This symptom complex resembles the pseudosclerosis of Westphal-Strümpell and the two terms are very frequently interchanged. The disease consists essentially of a degeneration of the corpus striatum associated with a cirrhosis of the liver.

The first case was described by Westphal[1] in 1883, and eleven years later (1894) he ascribed the term pseudosclerosis to it. In 1898, Strümpell[31] reported a case in which he ascribed the peculiar pigmentation of the skin to argyrosis. In 1912, Wilson,[2, 3] on the basis of earlier works, studied a case *post mortem* and described the essential pathological changes consisting of glial proliferation, colliquation necrosis and hole formation in the corpus striatum, especially in the region of the putamen and globus pallidus. He called the condition degeneratio lenticularis progressiva, and in 1933 reported two more cases.

Prior to 1900, the cases were grouped with those of multiple sclerosis in spite of the fact that nystagmus and optic-nerve changes were absent. The familial tendency was noticed even at this early date.

The ring which is typical of the condition and has in recent times been known as the Kayser-Fleischer ring, was first described by Kayser[4] in 1902. This was found in a 23-year-old patient who had what was believed to be multiple sclerosis. The periphery of the ring was yellowish white and toward the center it was of a yellowish-green color. The exact depth of the ring in the cornea was not known. In 1903, Fleischer described the ring in a patient who was thought to have multiple sclerosis.

In 1908, Salus[5] described a similar ring in a patient of his own but was still under the mistaken belief that his patient had multiple sclerosis.

In 1909 and 1912, Fleischer[6, 7] designated the ring as a part of a hitherto unknown clinical entity. In this he drew for support on the work of Rumpel who found pigment in Descemet's membrane, the lamina vitrea, and the pia mater of the brain.

Rumpel[8] and the chemist Söldner in 1909 demonstrated that silver was the basis of the pigment. In 1913, in a further study, Söldner found .00328 gm. of silver and antimony, and 0.0495 gm. of copper per 100 gm. of liver.

Rumpel called the disease pseudosclerosis. He believed that insufficiency of the liver led to a disturbance of the various bodily organs which in time caused a metabolic disturbance; this, in turn, producing an acute intoxication which brought on the visceral and psychoneurologic symptoms. He intimated that there must exist an association between the liver disturbance and the corneal pigment.

Forscher Hall,[9] in 1921, from a study of 9 cases stated that the pigment was endogenous, organic, perhaps of hematogenous origin but was *not* silver.

In 1922, Fleischer,[10] after further studies, came to the conclusion that the pigment was not silver. He considered it to be an endogenous pigment derived from hemoglobin.

In 1922, Siemerling and Oloff[11] and Vogt[12] concluded that there was no silver nor copper in the pigment.

Kubik,[13] in the same year, studied the pigment in Descemet's membrane by means of the Elschnig spectroscope method and by means of the absorption bands and came to the conclusion that the pigment was closely allied to urobilin.

Metzger,[14] in 1922, imbedded the pigment in celloidin and noticed that it slowly dissolved and disappeared. He considered it to be a lipoid pigment.

In 1925, Hessberg,[15] in his case complicated by a coloboma, found a change similar to that of the cornea in the anterior-lens periphery. He considered this to be urobilin.

According to Hugo Spatz,[16] the corpus striatum and also the substratum nigra showed a higher iron content than normal and he believed that there was a special chemical relationship. The intimation here of course was that the ring had iron as its basis.

Enlarging on their original work (1913), Rumpel and Söldner, together with Oloff and Vogt,[17] in 1930 determined that the ring consisted essentially of silver. In fact, Vogt determined a measurable amount of silver in a patient with Wilson's disease.

D. L. Poe[18] gave an ingenious explanation for the formation of the pigment ring. His view was that the corneal changes represent the derivatives of substances that are washed into circulation in the course of cirrhotic destruction of the liver. Probably the same processes are responsible for the lenticular changes in the cerebrum. Strangely enough, the hepatic degeneration eludes modern clinical tests and the increase of the icteric index is not constant. The author believes that increase of these substances in the aqueous, even in the minutest quantities, may by bathing Descemet's membrane at the periphery, at the anterior border ring of Schwalbe, cause a biochemical reaction resulting in a Kayser-Fleischer ring.

In 1934, Gerlach and Rohrschneider,[19] Fleischer and Gerlach,[20] as well as Rohrschneider alone[21] made spectroscopic analyses of the cornea and liver and found no silver present. However, they did find physiological amounts of copper which in their opinion had no relationship to the ring.

Associated phenomena

Several interesting phenomena have been associated with this condition.

1. In 1922, Siemerling and Oloff[22] described the sunflower or copper cataract in a patient with Wilson's disease. It was situated in the anterior portion of the lens, was of grayish-blue color and resembled a sunflower. The center was lighter than the periphery. It looked like a Purtscher pseudocataract. (This consists of a very delicate shimmering membrane situated in the anterior layer of the lens capsule. It can be seen only by oblique light and has a shimmering reflex of rainbow colors with red and green components predominating. It is pathognomonic of copper in the eye.)

This lens phenomenon was also noted by Vogt[23] in two cases. He thought it was due to copper poisoning and liver intoxication. Oloff, Hessberg, and Kubik also noted a peculiar color of the lens in two cases of their own, which were similar to Vogt's cases.

In 1927, Jess[24] studied Oloff's case histologically and found no cataract. He concluded that the appearance of the lens was due to a deposit on the anterior lens capsule and thought that there was a pigment derived from urobilin.

2. Fleischer and Metzger each reported a case of Wilson's disease with night blindness. Fleischer ascribed it to a hypothetical pigmentation of the lamina vitrea, while Metzger attempted no explanation at all.

3. W. I. Ling (1932) reported four cases, one of which Pillat[25] studied in detail; that of a young Chinese farmer 24 years of age who showed peculiar grayish-white spots in the retina. These were chiefly in the upper half of the

fundus and most numerous toward the periphery. They were 1 to 2 vein widths in diameter, round or oval, and white with a tinge of grey. The outlines were well defined, being blurred only in a few spots. The retinal vessels were in front of the dots, and had no relationship to them. The dots were present in both fundi but less marked in the left. Parts of the retina had a grayish-red appearance, which the author thought was a more special retinal degeneration.

4. L. Heine[26] (1933) reported the case of a 45-year-old woman with paralysis of the pupils, which did not react to light, and eyes which could not be elevated though there was no ptosis. He thought this was due to lues, though the Wassermann was negative.

Symptoms

Clinically, the symptoms begin insidiously with a tremor of the extremities which has a constant rhythm and a rate of 4 to 8 oscillations per second. Ultimately, it involves the body and the head, though to a lesser extent than the limbs. The tremor is aggravated by emotion and effort. Occasionally there are tonic and clonic movements but no athetoses. Together with the tremor, or shortly following it, there is hypertonia. The muscles gradually become hard and rigid. Those of the extremities become affected before those of the trunk and show resistance to passive motion. As the disease progresses, the rigidity becomes so marked that the patient cannot keep his balance—the body and limbs forming one piece. As a result of the hypertonia, contractures develop in the extremities. These contractures may be limited to one side or be bilateral and give rise to a picture simulating double hemiplegia.

The gradually increasing rigidity of the facial and speech musculature makes articulation difficult, leading first to dysarthria and ultimately to anarthria.

Drooling of saliva develops as a secondary symptom and finally also dysphagia; both from the muscular rigidity.

Despite the absence of fine paralyses, all the movements are gradually slowed by the rigidity, but reflex and involuntary movements are preserved for a long time. Muscular weakness, generalized atrophy, and emaciation become marked, especially in cases which progress more or less acutely.

Most patients develop anorexia and not a few complain of dull pains. Psychic or mental changes and emotional disturbances are evident in practically all cases. The patients show irritability, childishness, and ultimately dementia. Involuntary laughter is not uncommon and occasionally there is a peculiar spastic grin, the result of contracture of the facial muscles.

The deep and superficial reflexes are preserved and sometimes lively, but ultimately they cannot be elicited because of rigidity and contracture.

The Babinski sign is negative and as a rule there are no pupillary anomalies, ocular palsies, or nystagmus.

In the pseudosclerosis of Westphal, which is a closely related disease, the degeneration is more widespread and there are pathological findings in the thalamus, hypothalamus, pons, and dentate nucleus. In this condition, optic atrophy is occasionally found.

Pathology

In 1912, Alzheimer and Von Hösslin[27] found giant cells in the corpus striatum, the thalamus opticus, and the nucleus dentatus. They also described an absence of ganglion cells in the various parts of the cortex. Such widespread changes in the brain suggested changes in the retina, more like the changes found in cerebro-macular degeneration.

Tsiminakis[28] found an increased galactose output, a diabetic blood-sugar curve, and increased bilirubin content of the serum.

F. Lüthy[29] after a thorough study of several cases came to the following conclusions: 1. The liver was the first organ to be involved. 2. There were no true cases without cirrhosis. 3. The brain changes were intimately associated with the liver damage. 4. The brain tissue had a predisposition for the toxins liberated by the liver. 5. The metabolic disturbance was the primary change causing the liver damage.

According to Lüthy, there were three stages in the disease:

1. Cirrhosis.
2. Nervous symptoms.
3. Progressive decrease of mobility.

Miskalczy[30] studied the brain in great detail. He correlated the results of his observations with those made on the liver and concluded that the liver atrophy began during the life of the fetus. These findings are important if true. They have not been confirmed.

The modern conception of the condition is as follows: the pathological changes are localized in the corpus striatum. They consist of a symmetrical degeneration, probably lipoidal, of the putamen of the lenticular nucleus. The globus pallidus is but slightly involved but there is secondary degeneration of the ansa lenticularis and relative atrophy of the subthalamic body of Luys and the thalamic fibers. The lenticular nucleus, after it has undergone degeneration and atrophy, becomes porous and frequently has large cavities. As the normal structures disappear, they are replaced by glial cells and fibers. The blood vessels have no pathological changes. There is no evidence of inflammation. The liver is shrunken and has advanced multilobular cirrhosis ultimately presenting a typical hobnailed appearance.

The microscope reveals areas of fatty degeneration and necrosis, patches of normal liver tissue, and foci of active degeneration. The spleen is enlarged.

Clinical description of the Kayser-Fleischer ring

The Kayser-Fleischer ring consists of a narrow band or ring of pigment 1 to 2 mm. wide in Descemet's membrane adjoining the limbus. Occasionally it is not quite complete, being semicircular or crescent shaped. The condition is usually bilateral, although not necessarily so. It is most often of a brownish-green color and consists of tiny granules. The density of the ring has been found to increase toward the center by some observers and toward the periphery by others. It is best viewed with the slitlamp.

Course

The course of the disease is slowly progressive and ends fatally in from 2 to 4 years. Occasionally, it runs an acute febrile course terminating within a few months to a year. There is on record one case which lasted 9 years. As a rule, the patient remains a vegetating automaton until death terminates the illness.

Treatment is of no avail.

Case Reports

Case 1. J. G., a male, 16 years of age, and of Jewish parentage, was first seen in the Neurology Clinic on March 13, 1935. He complained of a loss of speech and a tremor, which had been present for seven months, of the right arm and leg. His parents noticed that his speech was less distinct and that it took him a long time to button his shirt while dressing. His speech disturbance had become progressively worse and it was difficult to understand him. His past history was essentially negative. He had had chicken pox and measles from which he recovered without complications. His parents were living and well. A sister, 8 years old, was "abnormal." She is described under Case 2 in this series. One brother had died at the age of 15 years of "dropsy."

The father was apparently a normal person both physically and mentally, the mother definitely psychopathic.

Laboratory Tests. The Kahn and Wassermann reactions of the blood were negative, as were also the blood count and urinalysis.

Eye Examination. The unaided vision in each eye was 1.2—1. There were no ocular symptoms. The eyes were normal except for a 1½-mm. band of pigmentation extending around the cornea, adjoining the limbus, widest above and below and situated in Descemet's membrane. The pigment was dark brown near the limbus and faded into a greenish-blue centrally. The interpupillary distance was 62 mm.

Physical Examination. The patient was a fairly well-developed and moderately well-nourished young white male. His physical examination was essentially negative. The liver was not enlarged. The circumference of the head was 55 cm. That of the father was 53.5 cm.

Neurological Examination. The patient was docile and coöperative and moved with a slow, almost athetoid action. He showed continuously a broad grin which very slowly varied in degree but was practically never absent. He spoke very little and his speech was definitely dysarthric and almost unintelligible. The cranial nerves were all normal except for a fine tremor of the tongue.

The deep reflexes were all present and normal symmetrically. The superficial reflexes were present and the plantar re-

sponses were both flexor. There was no patellar nor ankle clonus. There was a generalized muscular rigidity and definite extrapyramidal cog-wheel rigidity on passive movement of the limbs. There was a fine tremor of the hands and arms at rest which disappeared in action. The gait was slow and shuffling, and the general appearance of the patient was that typical of paralysis agitans but with the distinct difference that there was some expression in the face, and the motor movements were more jerky and wider in extent.

Impression: Bilateral extrapyramidal disease with emotional instability and the appearance of constant euphoria.

Case 2. F. G. was brought to the clinic at our request on March 27, 1935. She was eight years old. Her parents stated that she had been a full-term child delivered with forceps. Her head had been very small at birth and had remained small. She had had difficulty in nursing but had been apparently healthy until she was eight months of age. Then she began to have convulsions of unknown cause. She would lie on the floor and appear to be unconscious for from one-half to one minute. Accompanying the attack was a horizontal nystagmus. No spasmodic nor convulsive movements of the limbs occurred, nor did the patient cry out. The lips became cyanotic and following the attack she complained of pressure "back of the head."

She did not walk until she was four years of age. Neither the date of the appearance of her first tooth nor the age at which she began to talk was ascertainable.

She is unable to dress herself except for putting on her shoes and stockings. Her speech has always been incoherent and even the parents understand little of what she says. She is habitually active and very happy.

Physical Examination. Aside from the small head, 41.5 cm. in circumference, the findings were negative. The liver was not enlarged. The Wassermann test was negative.

Neurological Examination. Neurological examination was made on May 17, 1935. The patient could speak only a few words and her enunciation was very poor. She apparently understood only very simple commands and did not coöperate in any way. She was so mentally retarded as to be incapable of looking after herself in any way except to eat unaided. Her height was 116 cm. and the circumference of her head 41.5 cm.

The cranial nerves were all normal and specifically there was no limitation of conjugate movement in the eyes in any direction; there was no defect in convergence nor in the accommodation reaction and no nystagmus.

The deep tendon reflexes were all present and all were symmetrically increased. The abdominal reflexes were all absent and both plantar responses were extensor. There was no patellar clonus but an unsustained ankle clonus on both sides.

The only form of sensory appreciation which could be tested was pin prick and that appeared to be normally and symmetrically appreciated over all the body.

There was no localized weakness in any limb and no localized atrophy nor deformity, no pyramidal nor extrapyramidal resistance to passive movement in any limb, no tremor at rest nor in movement, and no taxia nor incoördination in the performance of voluntary movements. There was no involuntary movement of any type.

The child walked with no stiffness of the body nor of the limbs, with no ataxia and no evident spasticity. The arms swung freely, and the head was carried erectly upon the shoulders. The facial expression was not intelligent but there was no sign of the slow, excessive smile so characteristic of her brother.

The liver was not enlarged.

Impression: Microcephaly, extreme mental retardation, bilateral pyramidal disease, no extrapyramidal signs.

Eye Examination. The patient appeared to have good vision though accurate testing was not possible. The pupils were round, active, and reacted to light, accommodation, and convergence. There was no nystagmus. The interpupillary distance was 48 mm. The discs and fundi were normal.

In both corneae there was a continuous greenish ring in Descement's membrane adjoining the limbus with no normal cornea between it and the limbus. The rings were of lighter color than those in her brother's eyes. They were 1 mm. wide nasally and temporally and 2.5 mm. wide at the superior and inferior borders.

Case 3. L. S., a white male, 13 years of age, was first seen in the Pediatrics Clinic of the Bobs Roberts Memorial Hospital on June 22, 1934. He complained of a severe abdominal pain of eight years' duration. He had been a full term, normal infant. At the age of five months he had had a "bloody diarrhea" but made an uneventful recovery and had been apparently normal and healthy until he was five years of age when he began to have attacks of "pain in the stomach," which were frequently associated with vomiting. These most often occurred early in the morning, frequently before breakfast. The vomitus was usually clear liquid. These attacks had continued several times per week since the onset. His abdomen felt distended most of the time and he "lacked pep."

For the past year, he had been on a low carbohydrate diet with some relief. He had had no vomiting but continued to have attacks of indefinite abdominal pains. Constipation was the rule but was alternated with periods of diarrhea lasting two to four days. During this period the patient had become nervous and irritable, and his hands "shook" so that he could hardly write at school. He began to have emotional changes and cried frequently. The patient had enuresis and his mother noted that he passed large quantities (2 quarts) of dark urine in the morning.

He had had chicken pox at the age of three years, German measles at the age of five years, and measles at the age of six years, and had recovered with no complications. His father and mother were both living and well. The family history was negative except that an older sister was "nervous."

Physical Examination revealed a well-developed and moderately well-nourished child who was not acutely ill. There were four or five carious teeth, a few palpable (but not tender) cervical glands, a faint systolic murmur of the apex, and slight tenderness on pressure in the right lower quandrant. His blood pressure was 126.

He was admitted to the hospital. The Mantoux test, 1:1000, was negative, as were the Kahn and Wassermann reactions of the blood. His blood count, urinalysis, stool examinations, urea index, and urea nitrogen were all normal. The proctoscopic examination revealed a normal rectum and lower sigmoid. X-ray examination revealed a normal esophagus, stomach, duodenal bulb, and colon. The patient was placed on a low-residue diet and at the time of his discharge from the hospital, three weeks later, he had definite relief from his abdominal pain. No clinical diagnosis was established.

The patient was readmitted to the neurological service on December 9, 1933.

Neurological History. His principal difficulties at this time were: (1) uncoördinated movements of the left arm and hand with a progressive loss of strength, of 16 months' duration; (2) difficulty in speech without aphasia and a tendency to drool saliva for 14 months; (3) sharp shooting pain up and down the left arm and to some extent the left leg, especially during the last few months.

Six weeks after his discharge from the pediatric clinic the patient began to have trouble buttoning his clothing. He thought that his hands were "numb." There was no associated pain. A few weeks later, the patient developed a tremor of the hands which tended to disappear with rest. Two months later, the patient's speech became slow and blurred, and he drooled saliva from the right side of his mouth. For the last few months, he had had continuous dull, aching pains in the left arm and leg. He also noticed a slight weakness of his left leg at this time. Recently the patient had a feeling of falling backward and at times a desire to walk backward. He had passed from 2 to 4 quarts of urine daily for the past four months and he had become more nervous and irritable. His father noted that the patient's breasts were somewhat feminine in outline.

Neurological Examination revealed an alert intelligent youth of 15 years, with no evidence of psychic disturbances. The body was slender with no adiposity. Genitalia were well formed. The pubic hair was of feminine distribution. The breasts were feminine in contour. Cranial nerves I, II, III, IV, V, and VI were normal. Chvostek's sign was present on both sides. Hearing was good. Palatal reflexes were absent. Pharyngeal reflexes were present and fairly active. The tongue protruded on the mid line slowly and with a coarse tremor of the Parkinsonion type. There was marked dysarthria. Strength was moderately decreased in all movements of the left hand and left lower extremity. The facies was not masklike. The patient smiled fairly easily with fair mobility. The gait was normal except for the fact that the right arm was held flexed at the elbow while the left was held extended. The fingers of both hands were extended at the interphalangeal joints, flexed sharply at the metacarpophalangeal joints, and the thumbs were abducted. There was a fine tremor of the outstretched hands, in addition to a quick, coarse, irregular tremor of the entire left upper extremity. The tremor tended to disappear at rest and was present in action although less marked than when the extremity was merely held outstretched. There was a fine tremor of the lower extremity in action but no tremor of the head. There was a cogwheel resistance of all extremities to passive manipulation most marked on the left arm. The muscular irritability to percussion was everywhere normal.

Superficial sensation was intact everywhere except on the dorsum of the left hand in an ill-defined area involving the thumb, the first, second, and third fingers, and the distal part of the thumb. Pain, touch, and temperature were decreased equally. Deep sensation was intact everywhere.

An encephalogram showed atrophy of both caudate nuclei.

The deep reflexes were uniformly increased. The planter responses were flexor. There was no ankle nor patellar clonus on the right side but it was present on the left.

The liver was not enlarged.

Eye Examination. The eye examination was negative except for a fine greenish-yellow punctate ring 1 mm. in width adjoining the limbus. This ring gradually faded into clear cornea. It could not be seen with the unaided eye. With the Comberg slitlamp the pigmentation was seen to lie in Descemet's membrane. It was slightly wider above and below than medially and laterally.

Case 4. S. R., a white male, 24 years of age, and of Polish parentage, was first seen in the clinic on October 10, 1934, because of a tremor of the hands, arms, and head which had been present for the past four or five years.

He had been a full term, normal infant, and had been in good health until at the age of two years he had had "rheumatism." At that time he had been confined to bed for 18 months because of complete paralysis and difficulty in speaking or swallowing, able only to move his head slowly from side to side. He does not know if there was any associated fever. This paralysis gradually disappeared in seven months and he had been quite normal again as a child and had lived a normal life through adolescence. He

had had no acute illnesses of any kind. He went to school and finished the eighth grade at the age of 16 years.

Four or five years previously, he noticed a coarse tremor of the fingers of the left hand. This progressed to the left arm and one month later the right arm was similarly involved. One month after that he developed a tremor of the head. While lying relaxed in bed, there was no movement. On attempting to dress himself or make any movements with his hands, the tremor was aggravated. He thought he felt better while walking.

Two years ago he suddenly had lost consciousness and fallen on his back. His eyes were turned upward and there was a generalized rigidity. This had lasted about two minutes. There had been no other convulsive attacks. The family history was entirely negative.

Physical Examination revealed a well-developed and fairly well-nourished young male who displayed a coarse rhythmic tremor of the head, mainly lateral, and also a similar tremor of the upper extremities. He had a normal play of facial expression and seemed fairly intelligent.

Eye Examination. The unaided vision was O.D. 1.5—3; O.S. 1.5—4. There was a mild bilateral ptosis. External ocular movements were normal except for an occasional horizontal rotatory nystagmoid jerk on extreme lateral abduction. Each cornea had a typically prominent deposit in Descemet's membrane, arranged in an irregular ring adjoining the limbus. It varied from brown to golden green in color and was 1.75 mm. in width above and below, and 1 mm. laterally. The discs were normal and the fundus was of the "tigroid" type.

Neurological Examination. There were no sensory changes of the face. There was a moderately coarse rhythmic tremor of the jaw. The palatal reflexes were weak but the pharyngeal reflexes were brisk. The tongue was protruded in the mid-line and showed a coarse tremor. There was also a coarse tremor of the fingers and hands, more marked on the left than on the right, which appeared with the slightest voluntary activity. In the finger-to-nose test, the first half of the movement was quieter than the second and he was unable to keep his finger on the tip of his nose. There was a moderate, uneven tremor of the unsupported head. A slight action tremor of the left leg was present. There was slight hypotonicity of the muscles of all four limbs. His speech was jerky and indistinct.

The liver was normal in size and in consistency and liver-function tests (bromsulphalein and galactose tolerance) were normal.

Laboratory Tests. The blood Wassermann and Kahn reactions were negative and microscopical examination of the blood and urine showed no abnormality. An encephalogram revealed slight dilatation of the third ventricle and some increase in the sulcus marking over the surface of the brain. The remaining ventricles were normal in size and shape.

Comments

The occurrence of the Kayser-Fleischer ring is not so rare as has been commonly believed, for the four cases here recorded were seen within a period of nine months.

In the classical description of Wilson's disease, there is involvement of the liver, yet in the three unquestioned cases of this condition here recorded none showed either an enlarged liver or disturbed liver function. This is in accordance with most of the cases now on record in the literature. In the fourth case also, the liver was of normal size.

Case 2 is of unusual interest because of the presence of the Kayser-Fleischer ring in a child showing microcephaly but as yet no evidence of extrapyramidal disease. The patient is only eight years old and may still develop a true Wilson's symptom complex. Her brother (case 1) began to develop symptoms at 15½ years of age. In no previous report has the Kayser-Fleischer ring been described in so young an individual. Its presence at this age may indicate that it does occur early and escapes notice until after the pronounced extrapyramidal signs lead to a diagnosis of lenticular degeneration.

Conclusions

1. Three fairly typical cases of lenticular degeneration with Kayser-Fleischer ring are described.

2. Signs of pyramidal disease and microcephaly together with a typical Kayser-Fleischer ring are described as occurring in the younger sister of one of the patients with true Wilson's disease.

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SUBJECTIVE STUDIES OF THE BLIND SPOT AND VISUAL FIELDS

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The author gives his experience in observing his own blind spots over a period of years. They may be seen by closing the eyes when facing the sun, or in bright daylight, or when facing a 100-watt electric lamp placed within two feet of the eyes. They are to be recognized by their shape, position, and movements. It is of value to ophthalmologists to understand this phenomenon because patients who are ignorant of the existence of blind spots complain of it. Read before the American Ophthalmological Society at Hot Springs, Virginia, June 5, 6, 7, 1935.

Study of the blind spot as a scotoma has been common of late years, especially the study of its enlargements in connection with certain diseases. The blind spot has been known for over two hundred and fifty years, since Mariotte called attention to it. Helmholtz made excellent studies of the blind spot by various methods, and Wilbrand has investigated methods for its detection and measurement. There seems to be no mention in the literature of the subjective method of viewing the observer's own blind spots—the size, shape, position in the field of vision, movements, and relation to retinal adaptation, or afterimages. Apparently no one has suspected that such observations might be of practical importance. The frequent watching of my own blind spots for several years has proved interesting; and an unsuccessful search of the literature for such observations suggests that it is a subject of sufficient importance to warrant me in bringing it to the attention of this Society.

Closing the eyes when facing the sun, or in bright daylight, or facing at night a 100-watt electric lamp placed within two feet of the eyes, one can perceive two dark spots in the luminous visual field; these by their shape, position, and movements are readily identified as the blind spots of the visual field. The experiment has been tried by a number of persons; and so far, no one who has intelligently performed it has failed to recognize his blind spots. The conditions necessary for such recognition are: the light must be bright enough, the illumination must be nearly uniform throughout the field, the retinas must be light-adapted, and a few seconds must be allowed for the scotomas to appear. On covering one eye, the scotoma belonging to this eye disappears, and a few seconds are needed for its reappearance, once the eye has been uncovered.

Closure of the eyes is necessary to obtain a uniform illumination of the field. The light entering through the normal lids is quite sufficient for the experiment. The waiting period is generally needed to secure the best adaptation, and to dispel the afterimages of objects previously looked at that obscure and attract the attention from the phenomenon sought. There must be freedom from strong dominating retinal images, but an absolutely uniform field is not essential. The spots can be seen against a clear sky or a uniformly light cloud, with the eyes open. In the same way they can be detected against a wall of a uniform tint; or on a wall covered with a light paper of nearly uniform tint, or at least free from any sharply outlined figures. At first there is difficulty in finding the phenomenon sought, since one does not know just what to look for. The same difficulty is encountered when attempting to see the circulation of the blood in the region of the macula.

The first striking characteristic of these spots is that they seem almost constantly to be moving in the field of vision. Both spots make the same movements, generally from side to side, but sometimes up and down or obliquely; but each spot always moves in the same direction and to the same extent as its fellow. This conjugate relation distinguishes the spots sharply from other scotomas and from the shadows cast by vitreous opacities on the retina—the common muscae volitantes.

It is not easy to arrest the motion of the spots, nor to control it entirely; although voluntary turning of both eyes up or down, or to the right or left, is easily recognizable in the apparent direction of the spots. The distance between the two spots is not readily varied by efforts of increased or decreased convergence. This finding agrees with what Helmholtz observed as regards judging the position of the blind spots and being able to ascertain the distance from his eye to his finger by touch.

There is generally no fixed point within the visual field with which the position of the blind spots can be compared. As a rule, however, the consciousness of motor action of the muscles of the orbit, neck, and head gives a convincing sense of their apparent direction. Probably this sense of direction is subject to the same errors as may be encountered by observing the apparent direction of a light with the eyes open but with the neck, head, and trunk twisted into unusual positions. The apparent direction of the two spots in the common visual field gives conclusive evidence that they are physiologic blind spots. They are more convincing than the earlier demonstration of a circle and a cross, in which fixing the cross with one eye at the proper distance, the circle was swallowed up in the blind spot. With both blind spots before our eyes, it is impossible to direct the eyes so that any point in the field shall fall in both spots at once, and so disappear entirely from consciousness.

It might seem that the movements of the blind spots could be studied in comparison with the movements of definite afterimages. Definite afterimages, however, are obtained best with strong light in a dark-adapted eye. The blindspots become most visible when the eye is light-adapted—hence comparison is difficult. Attempts at such comparison seem to show that different factors enter our consciousness of the movement of afterimages from those concerned in the search movements of the blind spots. It may be that the latter are wholly retinal, whereas afterimages depend for their apparent directions on the impressions made on nerve cells of the cerebral cortex. This is a subject for further investigation.

The peculiar limited up and down, right and left, conjugate movements of the two blind spots seem to indicate that they represent fundamental coördinations of the movements of the two eyes which lie deeper than the functions of binocular fusion and binocular vision. It is reasonable to assume that these movements are closely associated with orientation of directions, developed for the harmonious association of the visual fields of the two eyes, that existed before ocular movements were dominated by macular vision, with perfect correspondence of foveal images and the perfecting of binocular foveal fixation.

The color of the blind spots thus seen is a neutral gray, which varies little with differences in the color of the field on which they are seen, or with previous exposure to colors by strong light. With the sun shining on the closed lids, there appears but little tendency to see a complementary green against the decidedly red tint of the general field. When the field is white, as seen with strong mercury-vapor blue light, no yellowish tint can be perceived in the spots. The possible faint tints revealed by such tests are fully explained by contrast of the blind spots with the simultaneous color adaptation of the neighboring retina and the shifting of the spots in the field.

The "seeing" of our own "blind spots" constitutes a paradox that well illustrates the cerebral character of all our seeing. In the mass of sensory cells that constitute the visual centers there is no vacancy—no break—in the continuity of cells prepared to receive impressions made by the visual apparatus. There are cells in position to receive all possible impressions made on the retina, and each is correlated and coördinated to indicate the direction from which light comes, or does not come, to make an impression. It is this permanent coordination for orientation that enables us to see the break in the visual field caused by our own blindspots. The apparatus perfected by long ages of evo-

lution is ready to serve us whether or not we use it. In order to use it, however, we must know that it is there; and in order to apply it to our uses, we must have some knowledge of its functions.

In contrast to the absence in our literature of reference to the subjective appearances of the blind spots is the fact that those who have never heard of the blind spot can recognize the appearance of their own blind spots in their visual fields. Within the last year two patients have come to me because of "spots before their eyes," the only reason for their complaint being a perception of their blind spots. The conditions under which the spots were observed—their size, shape, positions in the visual field, and their movements—all corresponded to those of the blind spots, and examination revealed no pathologic condition that could cause scotomas or muscae volitantes. An explanation of what it was that they saw, and of the conditions under which they could see the spots, satisfied these patients and no further trouble was experienced. One who has made himself familiar with such spots in his own eyes will have little difficulty in recognizing them by the description given by the patient. Nevertheless there is no doubt as to the annoyance and worry they sometimes cause both patient and physician when the nature of the supposed muscae is not understood.

By acquiring familiarity with the apparent movements of the blind spots it may be possible to reach a better understanding of the complex cerebral processes involved in human vision, and it is because of this that they deserve the attention of ophthalmologists.

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THE EFFECTS OF MYDRIATICS UPON INTRAOCULAR TENSION

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CHICAGO

This paper does not lend itself to review. It was read before the American Ophthalmological Society, at Hot Springs, Virginia, June 5 to 7, 1935.

Being curious as to the actual effects of mydriatics and cycloplegics upon intraocular tension, tonometric measurements were made upon a series of consecutive private patients past thirty years of age. In order to eliminate extraneous influences as far as possible, the following procedures were adopted:

(1) No case of manifest ocular disease was included in the series.

(2) All tonometric measurements were made by the same person (a trained nurse) with the same instrument (a Gradle-Schiötz tonometer), in the same room, the patient lying flat on the back upon an operating table. The measurements were made under uniform indirect illumination of seven foot-candles, and under the anesthetic effect of two drops of 2 percent butyn given at a 3-minute interval. Every measurement was repeated with two different weights and the average recorded. If a difference of more than 3 mm. Hg was found, the measurements were repeated and rechecked by either Dr. Meyer or me.

(3) The primary reading was made between 9:00 and 10:00 A.M. Then mydriatics were instilled (six drops of 2-percent homatropine hydrobromide at 5-minute intervals, or four drops of 2-percent euphthalmine at 5-minute intervals). Retinoscopy was done, refractive measurements were taken, and a fundus examination was made.

The secondary readings were made approximately two hours after the first drop of mydriatic had been instilled; that is, between eleven and twelve-thirty in the morning.

The final readings were made after the postcycloplegic examination was completed, some 48 to 72 hours subsequent to the primary reading, and usually between ten and twelve-thirty in the morning. The same procedure was followed as in the primary readings.

(4) If, at the second reading, an increase in pressure of more than 4 mm. Hg was found, pilocarpine was instilled and another reading made 15 minutes later. No patient was allowed to leave until the pressure had returned to within the so-called normal range.

Five hundred consecutive patients, that is, one thousand eyes, were examined in this series. Except in the first tables (A, B, C), reference will be made to individual eyes and not to an individual person.

A. General Classification

Males..151 Females..349 Total..500

B. Classification by Age

From 30 to 40 years of age	150
From 40 to 50 years of age	118
From 50 to 60 years of age	88
From 60 to 70 years of age	98
From 70 to 80 years of age	37
From 80 years of age upward	9
Total	500

C. Classification According to Mydriatic Used

Homatropine was used in	118
Eupthalmine was used in	382
Total	500

D. Details of Classification by Decades Age 30 to 40 Years

300 eyes with an average pressure of 18.91 mm. Hg.

Minimum pressure, 13 mm. Hg. Maximum pressure, 26 mm. Hg.

9 eyes, or 2.9 percent, increased in pressure from 5 to 17 mm. Hg (average 12.2 mm. Hg).

E. Details of Classification by Decades Age 40 to 50 Years

236 eyes with an average pressure of 19.20 mm. Hg.

Minimum pressure, 13 mm. Hg. Maximum pressure, 26 mm. Hg.

5 eyes, or 2.1 percent, increased in pressure from 5 to 10 mm. Hg (average 7.8 mm. Hg).

F. Details of Classification by Decades Age 50 to 60 Years

176 eyes with an average pressure of 20.05 mm. Hg.

Minimum pressure, 13 mm. Hg. Maximum pressure, 31 mm. Hg.

4 eyes, or 2.2 percent, increased in pressure from 5 to 17 mm. Hg (average 11.7 mm. Hg).

G. Details of Classification by Decades Age 60 to 70 Years

196 eyes with an average pressure of 20.18 mm. Hg.

Minimum pressure, 14 mm. Hg. Maximum pressure, 28 mm. Hg.

4 eyes, or 2.0 percent, increased in pressure from 5 to 17 mm. Hg (average 10.8 mm. Hg).

H. Details of Classification by Decades Age 70 to 80 Years

74 eyes with an average pressure of 18.93 mm. Hg.

Minimum pressure, 13 mm. Hg. Maximum pressure, 26 mm. Hg.

4 eyes, or 5.3 percent, increased in pressure from 5 to 9 mm. Hg (average 7.5 mm. Hg).

I. Details of Classification by Decades Age 80 Years and Upward

18 eyes with an average pressure of 19.3 mm. Hg.

Minimum pressure, 16 mm. Hg. Maximum pressure, 24 mm. Hg.

2 eyes, or 11.1 percent, increased in pressure from 5 to 8 mm. Hg (average 7.5 mm. Hg).

J. Recapitulation of Tables D to I Inclusive

Owing to the very small number of cases in the decade 80+ the percentage of increase of more than 4 mm. Hg is unduly high. If this decade be eliminated, the average percentage of increase of more than 4 mm. Hg is only 2.8.

K. Classification of Pressure According to Refractive Error

Emmetropia: 91 cases, or 9.1 percent. Average pressure, 18.7 mm. Hg.

Hyperopia: 0 to +1.50 sph., 294 cases, or 29.4 percent. Average pressure, 19.4 mm. Hg.

Hyperopia: +1.50 to +3.00 sph., 109 cases, or 10.9 percent. Average pressure, 19.4 mm. Hg.

Hyperopia: +3.00 sph. upward, 58 cases, or 5.8 percent. Average pressure, 19.5 mm. Hg.

Myopia: 0 to —3.00 sph., 312 cases, or 31.2 percent. Average pressure, 19.2 mm. Hg.

Myopia: —3.00 to —10.00 sph., 81 cases, or 8.1 percent. Average pressure, 21.0 mm. Hg.

Myopia: —10.00 sph. upward, 55 cases, or 5.5 percent. Average pressure, 20.2 mm. Hg.

Total average pressure, 19.63 mm. Hg.

L. Comparison of Refractive Errors in This Series and in Glaucoma

It is of some interest to compare the incidence of the various errors of refraction in the series of cases here reported and in an unreported series of 359 cases of proved glaucoma of all types.

	This Series 1000 Eyes percent	Proved Glaucoma 359 percent
Emmetropia	9.1	6.4
Hyperopia (0 to +1.50)	29.4	39.7
Hyperopia (+1.50 to +3.00)	10.9	18.5
Hyperopia (+3.00 upward)	5.8	15.3
Myopia (0 to −3.00)	31.2	17.4
Myopia (−3.00 to −10.00)	8.1	1.4
Myopia (−10.00 upward)	5.5	1.3

Ages	30–40	40–50	50–60	60–70	70–80	80+	Average
Number of eyes	300	236	176	196	74	18	
Average pressure in mm. Hg	18.91	19.20	20.05	20.18	18.93	19.30	19.63
Pressure increased more than 4 mm. Hg	2.9%	2.1%	2.2%	2.0%	5.3%	11.1%	4.26%

M. Variations in Pressure in the Two Eyes of the Same Individual

In many instances, one or the other eye of the same patient presented a higher pressure at the primary reading. Although this had no effect upon the end result, it is of interest from other standpoints to present the figures thus obtained.

Differences in pressure between two eyes in mm. Hg	Right Higher No. of Cases	Left Higher No. of Cases
1 mm. difference	59	69
2 mm. difference	38	46
3 mm. difference	4	6
4 mm. difference	4	4
5 mm. difference	1	1
6 mm. difference	2	1
9 mm. difference	1	0
Total	109	127
TOTAL	236	

This formed 23.6 percent of the total number of eyes in the series in which the pressure was higher in one eye of the patient than in the other.

These tables require but little discussion as the majority are self-evident. Something should, however, be said regarding the 28 eyes that increased more than 4 mm. Hg in pressure under mydriasis. In 9 of the 28 eyes, the tension increased to a point where a definite suspicion of glaucoma was aroused, and further provocative tests proved the suspicion to be correct. But in none of the 9 eyes were there any subjective or objective findings, prior to the use of mydriasis, that pointed toward a glaucomatous tendency. Consequently, it is evident that routine tonometric measurements before and after the use of mydriatics or cycloplegics will bring about the early recognition of a glaucomatous, or rather a preglaucomatous, eye. It must be added that in every one of these cases the hypertension was controlled easily by the use of miotics before the patient left the office.

Summary

1. Five hundred consecutive patients past the age of 30, whose pupils were dilated for the purpose of ocular examination, were measured tonometrically immediately before the use of the mydriatic, 2 hours later, and 48 hours later.

2. The average primary pressure of these 1,000 eyes was 19.63 mm. Hg. The curve of pressure according to age is fairly uniform, being lowest in the 30 to 40 decade, rising steadily to a maximum in the 60 to 70 decade, and again decreasing after the age of 70 years.

3. The refractive error present does not seem to have any influence upon the pressure.

4. The percentage of refractive errors present in this series varies markedly from the percentage of refractive errors present in a series of 359 proved glaucoma cases of various types.

5. In 2.8 percent of the eyes, the pressure increased more than 5 mm. Hg under mydriasis and required the use of miotics to regain the primary level.

6. In 0.9 percent of the eyes, the increase in pressure under mydriasis led to further investigation which established the presence of a preglaucomatous condition.

7. In 23.6 percent the pressure was higher by 1 to 9 mm. Hg in one eye than in the other of the same patient.

Conclusions

In persons past the age of 30 years, tonometric measurements made immediately before and directly after the use of a mydriatic or cycloplegic are highly advisable. Neither the primary nor the secondary measurement alone is sufficient to be conclusive.

By this method, many cases of incipient glaucoma or preglaucomatous conditions may be found from months to years earlier than would otherwise be the case.

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MAGNET EXTRACTION OF INTRAOCULAR FOREIGN BODIES

Important Points in Technique

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The paper deals with practical points of technique as chosen from the viewpoint of the author's experience.

The history first draws attention to a possible foreign body in the eye. Some foreign bodies will be obvious. The important ones are those which are not. Question every patient as to whether a single inflamed eye could have been injured in any way. If it might have been injured, ask exactly what happened, the kind of work the patient was doing, what tools he was using and how, his position, the direction in which he was looking, and what he saw and felt.

There may be no symptoms, and very often no pain. There will be varying degrees of redness, tearing, photophobia, blepharospasm, and change in vision.

The examination should be painstaking and thorough. One should look for minute wounds in the cornea, iris, and lens capsule, and for changes in the refractive media and fundi, using every means at hand (the loupe, slitlamp, and ophthalmoscope). Light thrown behind the iris through the pupil brings out the hole, when otherwise it might not be seen. The sclera may be the point of entrance, although it has been estimated that foreign bodies enter the eyeball two hundred times more frequently through the cornea than through the sclera[1]. In almost every case of foreign body in an eyeball, careful search reveals its point of entrance, or its damage to other structures.

The diagnosis having been made, each case must be handled from its individual standpoint. One should know from the history, symptoms, and examination just what structures of the eye are damaged, what the vision is at the time of the first examination, what changes may later occur to alter the vision, and what the foreign body is likely to be, single or multiple, one eye or both, magnetic or nonmagnetic.

A probe should never be used to investigate an injured eye, nor should the eye be touched with any instrument until one is operating to remove the foreign body. If one considers it necessary, confirm the diagnosis with an X-ray examination.

With the electro-magnet, one removes the foreign body with as little further damage to the eye as possible. If the injury has destroyed the vision, removal of the foreign body will not restore it.

The history, symptoms, examination, point of entrance in the cornea, and the injury to the iris and lens should indicate the approximate location of the foreign body and its size. If one knows just how the patient was working and in what direction he was looking, and can examine the tool used, he has enough information to suggest the best method of extraction.

If a foreign body can be seen with the ophthalmoscope, no X-ray examination is needed. In certain cases, even when it cannot be seen with the ophthalmoscope, it can be located with almost the same exactness by these careful observations. In such cases an X-ray film is not necessary except to check the position. If the anterior route is chosen, exact X-ray localization does not change the operative procedure; moreover, in certain procedures by the posterior route, the X-ray localization is not absolutely necessary, for it does not change the method of operating. If there is no response to the magnet when the history and examination indicate a foreign body, several X-ray films must be taken before one can be satisfied that there is none. In cases of long standing (one month to three years) in which inflammatory changes have taken place, the X-ray examination is of more importance.

I prefer the anterior route if the foreign body is small enough. Haab says it must be 3 mm. or less. Larger pieces, if they have made large wounds in the cornea and lens, will frequently come

out by the same route as that by which they entered; also, in early cases, if the entrance is in the sclera, the foreign body should be taken out at the point of entrance. This would nearly always be easy if it were not that at times the piece of steel, because of its polarity, tends to twist around and often presents a flat side, if it is not far enough away to turn completely around, requiring a larger opening than the point of entrance for its removal.

If the anterior route is chosen, the eye is prepared, anesthetized, and the pupil dilated. The magnet tip is placed over the center of the cornea a little distance from the eye, and the current turned on; if no response, the magnet is brought to the center of the cornea. If the foreign body does not come into and through the posterior chamber, the current is turned off and on several times, while the patient is instructed to look up and down, right and left, in order to bring it up. If the pupil is well dilated with atropine or a subconjunctival injection of cocaine and adrenalin[2], the foreign body can usually be brought through the pupil into the anterior chamber without damage to the iris. It is surprising how seldom the lens is injured or the iris entangled. If this does occur, a traumatic cataract, in an occasional case, or an occasional iridodialysis or iridectomy, on the whole, gives a better eye than removal through the sclera. If the lens is severely injured by the foreign body as it enters the eye, immediate removal of the traumatic cataract at the time of magnet extraction should be done[3].

If the foreign body becomes entangled in the iris, it can sometimes be released by placing the magnet so as to pull it back, or up or down, and toward the limbus, and then applying the magnet above and opposite, rather than directly opposite the foreign body. If it does not then present, an iridectomy is done, and the steel is either removed with the iris, or allowed to come through the iris opening.

The foreign body is removed from the anterior chamber through a keratome incision parallel with the plane of the iris and close to it to avoid a shoulder at the limbus, or, through a corneal incision nearly at right angles to the cornea so that the foreign body will not catch on the lips of the wound.

If it is known that the foreign body is too large to come around the lens into the anterior chamber, or if it is impossible to bring it there with the magnet, it will be necessary to remove it by the posterior route. In my experience, the best results are obtained by bringing the foreign body to a spot between the lateral and inferior recti and between the ciliary body and the ora serrata, the examination indicating whether it is to be done between the external and inferior rectus, or between the internal and inferior rectus. By this method exact X-ray localization is not necessary. The operative procedure is the same. The magnet is used to bring the foreign body to the selected spot just as one brings the foreign body into the anterior chamber for the anterior route.

When, by pain or bulging of the sclera, one knows the foreign body is in this location when the current is turned on, the conjunctiva is dissected up, and a crucial incision is made in the sclera, the longer being made meridionally (to avoid blood vessels) and the shorter at right angles, both just through the sclera. The choroid and retina are avoided as much as possible, and the vitreous is treated with the same respect that is accorded the lens. The blunt magnet tip is placed in the incision and the current turned on. The tip is left in place half a minute and moved about a little, then very slowly withdrawn. If the foreign body does not come out, the procedure is repeated. Keep trying, studying just what is preventing the piece from coming out, and overcome the difficulty. One may have to nick the choroid and retina, or enlarge the scleral incision. Do not use magnet tips which protrude into the vitreous until removal of the foreign body with the blunt tip has been tried on three successive days. Disturbed vitreous means loss of vision. After working one half to three quarters of an hour, wait until the next day. I have tried unsuccessfully for two days, only to have the foreign body come out at the first attempt on the third day. I have not found that in the cases in which there was no disturbance of vitreous or undue bleeding, more vision

was lost than in those in which the foreign bodies were removed at the first attempt; while trauma to the vitreous has always resulted in lessened vision. If successful, I prefer not to suture the conjunctiva. If, however, at this point there has been failure, an exact X-ray localization is essential before tips are introduced into the vitreous, for considerable loss of vision will follow.

The incision should be made as near the foreign body as possible, using the technique already described, avoiding blood vessels, subjecting the vitreous to minimal disturbance, and using tips which protrude into it only as a last resort.

The disastrous result of trauma to the vitreous was impressed upon me in the following case:

A man presented himself with a piece of steel in his eye which could easily be seen with the ophthalmoscope near the equator, temporally. His vision was still about 20/40. After the usual preparations, the scleral incision was made by boldly plunging the knife into the vitreous then making a short cross cut on one side so that a *T* incision resulted. There was very little bleeding. The foreign body promptly came out when the blunt tip was placed in the incision, and the wound was not sutured. It was one of the quickest extractions I had ever done, with almost no manipulation. I confidently expected good results. There was no visible bleeding into the vitreous, but the latter became cloudy, and at the end of four days, the time during which I had the patient under observation, vision dropped to 20/100. I still hoped he would improve, but upon examination three months later he had a soft degenerating eye filled with vitreous opacities, and vision for only large moving objects.

In contrast, in a similar case, with vision 20/15, a smaller foreign body, seen with the ophthalmoscope, was removed in the same way, only the vitreous was not penetrated, and 20/15 vision was obtained, which has remained for ten years.

As a rule, the conjunctiva has not been sutured. In a few cases, I decided a more surgical procedure would be to suture the conjunctiva, and, unfortunately, in some there was a little bleeding in the incision. The suture forced blood into the vitreous, and opacities and loss of vision followed.

Retinal detachment has been described as a frequent complication in removal by the posterior route, but I have not observed it so often; in most of the cases the foreign body has been removed near or in front of the ora serrata.

Summary

Every inflamed eye should be suspected of containing a foreign body. The history, symptoms, and examination will indicate when and how the magnet should be used. If the wound of entrance is large, the foreign body should be removed through it. If the foreign body is small, it should be removed by the anterior route.

If the foreign body cannot be brought into the anterior chamber, or, if it is large, it should be removed by the posterior route by bringing it, if possible, to a selected spot (1) to avoid bleeding, (2) to avoid vitreous injury, and (3) to lessen retinal detachment.

An X-ray examination is not necessary, for it does not change the operative procedure, if removal is possible by (1) the original wound, (2) the anterior route, or (3) the posterior route as a selected spot.

An X-ray examination is necessary (1) when there is no response to the magnet in cases of suspected foreign body, (2) when the foreign body cannot be brought to the selected spot posteriorly, (3) when the magnet has failed to remove the foreign body, (4) in cases of long standing, and (5) in certain cases to confirm the diagnosis.

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NOTES, CASES, INSTRUMENTS

ACUTE GLAUCOMA SECONDARY TO RELAPSING FEVER FOLLOWED BY UVEITIS*

Case Report

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J. M., aged 34 years, a golf professional in robust health, spent the summer of 1930 at Lake Tahoe where he was occupied in laying out a golf course. Two weeks prior to his admission to the Pasadena Hospital, on September 21, 1930, he had begun to feel "sick all over." He had had fever, chills, some headache, and urinary frequency, and had been treated by an osteopath without benefit.

On September 20, 1930, the day before his admission to the hospital, the patient was seen at his residence by Dr. Walter P. Bliss. His temperature was elevated; he was worried and a little flighty. On admission to the hospital, his temperature was 101.6°, pulse 100, and respiration 20 to 30. The urine was cloudy and contained pus cells and abundant phosphates. He had been nauseated and had vomited but there had been no abdominal pain. The skin was hot and moist. He was perspiring profusely and was restless, but in no pain.

The pupils reacted to light and in accommodation; ocular movements were normal; the sclera was injected. The nasal mucous membranes were congested. The throat was congested but without patches, the tongue coated. The general physical examination was negative.

On the following day the results of the blood examination were: erythrocytes, 4,630,000; hemoglobin, 73.9 percent; leucocytes, 8,800; small lymphocytes, 17; large lymphocytes, 11; large mononuclears, 3; neutrophiles, 65; transitionals, 3; eosinophiles, 1. The Widal test was negative. The blood culture showed no growth after 96 hours.

On September 23d, the temperature was normal and the urine also normal. The patient was sent home on the following day, his probable diagnosis being influenza.

He was admitted to the hospital with a temperature of 100°, pulse 92, respiration 20, on October 2d. The next day his temperature was normal, and he was discharged on October 4th. X-ray films of the teeth and sinuses were negative, as was also the agglutination test for Malta fever. Again the blood culture was negative after 48 hours.

On October 9th, he had a high fever and chills and complained of pain in the left eye which had started the previous day. The pupil was active, there was ciliary injection, and the cornea appeared to be a little hazy. The tension (McLean) was 45 to 50 mm. Hg. There was no cupping of the nerve head, nor was the field contracted. Pilocarpine and eserine were prescribed, and tension in the eye began to subside until on October 13th it became normal. The pilocarpine therapy was not discontinued until the first of November.

On the supposition that the patient might be suffering from relapsing fever, though a blood smear was negative for spirochetes, he was given 0.3 mgm. of neo-arsphenamine intravenously. On October 27th he had another chill and the temperature rose to 103°. Blood smears at this time showed many Spirochaeta recurrentis, about one to every third field. The patient then recalled having been bitten behind the right ear on August 27th, while at Lake Tahoe. This bitten area had swelled to the size of a "cranberry," hard as a rock but not tender, had persisted for three or four days, and had then disappeared. Neo-arsphenamine was accordingly administered intravenously, 0.6 mgm.

On November 1, 1930, the patient was seen at the office. His tension in the

*Read before the Western Ophthalmological Society, Portland, Oregon, May 24, 1935.

left eye was 22 mm. Hg (McLean). Pilocarpine was discontinued and he was instructed to report in two days. He did not, however, return until February 26, 1931, when the eye was soft but the vitreous so full of floaters that the fundus could not be seen. Two days later the tension, O.S., measured 33 to 35 mm. Hg. Pilocarpine was prescribed. On March 4th, the left eye became painful. The tension was 30 mm. The anterior chamber was full of precipitates, the pupil small, but it dilated well under a mydriatic. Hot compresses were ordered. The patient suffered greatly from this fresh complication. It was difficult to keep the pupil dilated and prevent the formation of synechia, and on March 9th it was necessary to send him into the hospital again, where he remained for nine days undergoing vigorous treatment for the severe uveitis.

By the end of March the eye was almost white, the pupil oval, and vision had much improved. His tension, however was 38 to 40 mm. (McLean) so that it was necessary to resort again to the use of pilocarpine, night and morning.

On April 20, 1931, the vision in the left eye was 6/7—; the tension was normal to fingers, and the vitreous opacities were thinning out, but there was a large dense fusiform opacity in the lower part of the vitreous. Nearly four years later (March 16, 1935) the vision was O.D. 6/5 —3; O.S. 6/6. A few fine vitreous opacities were to be seen in the left eye. At the 11-o'clock position, a tag of pigment was seen to be attached by a fine filament to a pigment spot on the lens. The pupil was round and active; tension normal to the fingers.

Dr. M. N. Beigelman, a native of Russia, where relapsing fever is prevalent, writes in a personal communication to me, "The common ocular complication of relapsing fever, as observed in Russia during the epidemic of 1920-21, was a uveitis with vitreous opacities. The number of uveitis cases of this type seen in the Eye Hospital of the University of Don during those years was 800, constituting 5.3 percent of the total number of eye patients in this period and 1.7 percent of all who had had relapsing fever. There was no record of acute glaucoma, although in several cases the uveitis resulted in complete seclusion of the pupil."

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PHOTOGRAPHICALLY RECORDING THE PHORIAS

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AND
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It has been comparatively easy to get good pictures of strabismus cases before and after surgery or orthoptic training, with almost any type of camera. Attempts to photograph the phorias are more difficult, especially in patients with strong fusion power who fuse immediately when the screening element is taken from before one eye.

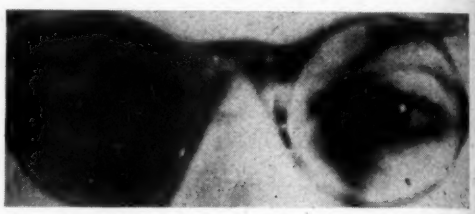

Fig. 1 (Pinkerton and Cowan). Photograph of exophoria.

The camera used here was one of the miniature type with a fast lens, but any camera for which infrared film is obtainable can be used. Illumination was secured by means of two Mazda Photo Flood bulbs, one placed three feet and the other twelve inches away, both at about an angle of 45 degrees from the patient. The infrared filter and film are made by the Leica Company.

The picture used for the illustration was taken at one meter and enlargements made. For detailed close work, a 5- or 6-inch telephoto lens may be used, but for amateur work this is not necessary. The photograph shows the exophoric eye behind a red glass. The red glass breaks up fusion and the eye assumes the position indicative of the phoria, yet the picture is possible because of the infrared film.

AN UNUSUAL VORTEX VEIN

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AND
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The vortex veins carry most of the venous blood from the iris and ciliary body and the whole of that from the choroid. Those vortices average 15.2 mm. in length and run very obliquely through the sclera in canals 4 to 5 mm. in length. Although variations do occur, usually by the doubling of one or more trunks, there are usually four such veins disposed almost symmetrically 90 degrees apart. The point of exit of the upper pair lies 7 mm. (nasal vein) and 8 mm. (temporal vein), and of the lower pair 5½ and 6 mm. behind the equator, the two temporal veins being associated with the tendons of the oblique muscles.

The two superior vortex veins enter the superior orbital veins and the two inferiors the infraorbital vein. The superior orbital vein, the largest in the orbit, is formed in the upper and medial corners of the orbital margin by union of the supraorbital and angular vein of the face, and runs backward, leaving the orbital cavity by the superior orbital fissure, usually above the annulus of Zinn, to enter the anterior part of the cavernous sinus.

The inferior orbital vein begins as a venous network on the floor of the orbit, receiving branches from the lower-lid and lacrimal-sac regions, the inferior rectus and oblique muscles, and the inferior vortex veins. It divides into two main branches—an upper larger one which runs through the superior orbital fissure beneath the annulus of Zinn into the cavernous sinus, and a lower which runs through the inferior orbital fissure into the pterygoid plexus.

The unusual size, thickness, and the direction of the vortex vein to be described, together with the diagnostic possibilities it presented were important enough, it was thought, to furnish material for another unusual case report.

During a secondary strabismus operation on a young male it was necessary to locate the right external-rectus muscle. Upon separating the conjunctiva and Tenon's capsule, a fairly flat, reddish, nonpulsating piece of tissue about 4 mm. thick was encountered, lying 7 mm. from the limbus, and about 3 mm. below the horizontal line. It was at about the position of the muscle which was sought, and an attempt was made to expose it better so that the muscle clamp could be applied. The resemblance of this tissue to muscle was

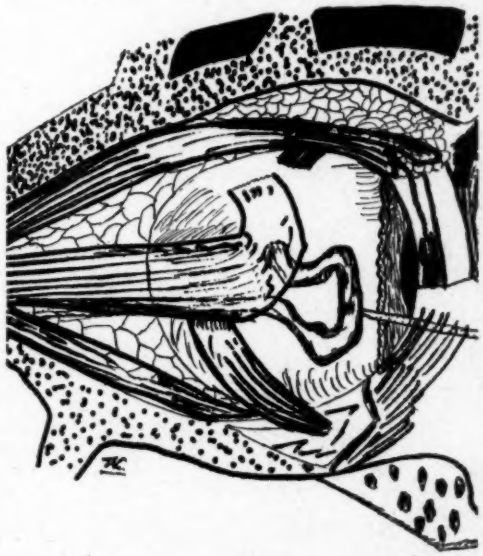

Fig. 1 (Pinkerton and Cowan). An unusual vortex vein.

enhanced by the fact that one could almost see muscle fibers. In uncovering more of this tissue it was noticed that instead of ending as a muscle stump it began to double back upon itself downward and backward.

At about this time the real muscle stump was found but even then the resemblance was so marked that this "foreign" tissue was suspected of being an anomalous inferior-oblique muscle.

Further dissection revealed a tortuous thick-walled vein running in the general direction as shown in the drawing. It was not advisable to explore this vein to its termination and the drawing shows in dotted lines its visualized course.

The drawing was made as the vein was pulled forward by means of a muscle hook.

A NEW CONJUNCTIVAL FLAP FOR TREPHINING OPERATIONS*

F. H. VERHOEFF, M.D.
BOSTON

Owing to the danger of sympathetic uveitis incident to iridotasis, in cases of chronic glaucoma I have with increasing frequency resorted to trephining. For this operation during the past five years I have made use of a new type of conjunctival flap that possesses at least three important advantages over the usual flap. First, it provides better permanent drainage; second, it reduces

Fig. 1

Fig. 2

Fig. 1 (Verhoeff). A new conjunctival flap for trephining operations.

Fig. 2 (Verhoeff). Showing the completed operation.

the tendency to the formation of a vesicular "bleb"; and third, it greatly simplifies the entire operation. In preparing the usual conjunctival flap, the conjunctiva is dissected up freely around and behind the site for the fistula. As a result, the conjunctiva often becomes firmly fused with the sclera, filtration thus suffers interference, and leads to a marked vesicular condition and danger of late infection. Moreover, when the cornea is split, as it usually is, edema of the cornea in front of the fistula sometimes occurs.

The method of making the new flap is as follows: With a Graefe knife the conjunctiva is severed exactly along the limbus for a distance of about 4 mm. With forceps grasping the cut margin of the conjunctiva, the latter is undermined with knife or scissors close to the sclera sufficiently far back to permit exposure of the area to be trephined and also to permit the flap readily to be pulled down well over the cornea. The corneal surface is now denuded of epithelium for a distance of about 2 mm. in front of the selected site. With one needle of a double-armed black-silk suture (no. 1) a "bite" is taken in the cornea about 2 mm. long, parallel to and about 2 mm. from the limbus. Each needle is then passed through the conjunctival flap from beneath as indicated in the diagram (fig. 1). The two loops of suture are then placed on the sides out of the way. The sclera is trephined, iridectomy performed, and the operation completed by pulling the small conjunctival flap over the opening and tying the suture.

Following the operation, the anterior chamber is usually not re-formed for two or three days. The suture is allowed to remain for at least one week, preferably longer. As a rule, the bleb ultimately retracts to the limbus, but occasionally remains adherent for a short distance in front of it. In no case in which a previous operation had not been performed has the flap retracted so as to expose the fistula. In two cases, however, in which the conjunctiva was cicatrized as the result of previous operations, I evidently failed to dissect the flaps sufficiently and when the sutures were removed the fistulas became exposed. By covering the fistula with a large Van Lint flap I obtained a successful result in each of these cases.

243 Charles Street.

* From the Massachusetts Eye and Ear Infirmary.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

January 24, 1935

Dr. J. Milton Griscom, chairman

The history of the operative treatment of detachment of the retina

Dr. William Zentmayer said that the germ of all the present procedures might be found in the early literature of ophthalmology. As early as in 1857, Graefe performed puncture of the retina and in 1860, Kittle introduced scleral puncture. Wolfe later increased the puncture to an incision 8 to 12 mm. long. In 1889, Schoeler injected tincture of iodine in the preretinal spaces, between the retina and the vitreous. In 1893, Schoeler and Abadie independently sought by electrolysis to stimulate intraocular metabolism and thus cause absorption of the subretinal fluid, and at the same time produce a reactive chorioretinitis.

In 1877, McKeown excised a piece of the sclera and in 1879, Higgins employed a trephine for this purpose. In 1888, Gaupillar performed superficial cauterization. In 1903, Müller introduced the removal of an elliptical section of the sclera from the lateral wall of the eyeball, closing the wound by a number of horizontally placed sutures. He considered the special indication for this operation a high myopia where the detachment was of long standing, and usually total. Török and Heed had reported on the same operation.

In 1895, Deutschmann introduced his much-used procedure of retinovitreous transfixion and later also employed the injection of the vitreous of rabbits into the human vitreous chamber.

In 1910, Bettremieux introduced the removal of the superficial layers of the sclera tangential to the upper limbus of the cornea over an area 10 x 2 mm. The principle underlying this was to aid in the return of the blood from the eye by securing anastomosis between the deep-lying vessels of the sclera and those of the conjunctiva.

In 1917, Verhoeff employed electrolysis, introducing a cathode into the eye and placing the anode on the cheek. He used a large number of small half-curved needles which were passed through the conjunctiva and the coats of the eyeball until their tips appeared in the vitreous chamber.

In 1919, Gonin employed perforating thermocauterization, and in 1930, published the results of 250 cases. (He stated that definite cures can be obtained in about 60 percent of recent cases, this percentage decreasing with the age of the attachment.) In 1930, Guist placed a number of trephine holes to demarcate the separated from the attached portion of the retina by a cicatricial band, the thin remaining layer of the sclera being scraped away and the choroid touched through each of the holes with potassium hydrate. In the same year Larson and Weve developed a new method of diathermy in which a small negative electrode is applied to the sclera, the positive electrode being applied to some other part of the body. The object was to produce an adhesive coagulation that would reattach the retina. Weve later perfected a micropuncture method of electrolysis. Safar modified the diathermy procedure by using small tacks either singly or in groups. These are laid down in a curved line about the tear, employing a milliamperage sufficient to permit the needle to be implanted in the tissues by gentle pressure. In 1934, Vogt returned to the method of Verhoeff, introducing a cathode needle into the vitreous and placing the anode on the eyeball. A needle such as is employed in removing cilia by electrolysis is used. Dozens of momentary perforations can be made without damage. It differs from the Verhoeff procedure principally in that an attempt is made to place the punctures about the tear in the retina, when found. In 1934, Langdon reported the use of the thermophore in a case of retinal detachment, with successful result.

Microscopic pathology of retinal detachment

Dr. Perce DeLong read a paper on this subject. He said that traumatic detachment of the retina is more responsive to both medication and surgical treatment; but it should always be remembered that any retinal detachment is the expression of an irritation, whether it be caused by trauma, solar light, electricity, toxin, metabolic changes, insidious inflammation, a chronic irritation, or vascular changes. Cauterization of the choroid and retina with reattachment of the retina might temporarily alleviate the symptoms, but not in every case did it remove the cause and cure the disease.

Certain factors in the physiology, ophthalmoscopy, and microscopy of the reattached retina

Dr. Edmund B. Spaeth read a paper on this subject.

A. G. Fewell,
Clerk.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

February, 1935

Dr. J. Milton Griscom, chairman

Convergent concomitant strabismus of paralytic origin

Dr. Warren S. Reese thought that this case might be of interest in that it illustrated the fact that a concomitant strabismus might result from a muscle palsy. The patient first appeared at the Pennsylvania Hospital in October, 1931, at which time his external examination was negative. In February, 1932, he returned complaining of double vision. He then had a paralysis of the right externus, being unable to abduct the eye beyond the mid line. During the next several months abduction gradually improved but he continued to have strabismus. He now showed a convergence of about 20 degrees, the right eye deviating. On right lateral rotation he fixated with the right eye and with left lateral rotation with the left eye, fixation changing about 15 degrees beyond the mid line. The ocular movements in all directions were quite good. His subjective tests were unsatisfactory, for he did not understand English well. Vision was 6/6 in the right eye and 6/6 plus in the left eye. With the cover test, the right eye showed a greater deviation than the left eye and both eyes showed less deviation on looking to the right than on looking to the left. It would seem, therefore, that the case should now be regarded as one of spasm of the right internus rather than of paralysis of that muscle. These cases are said to be due to contracture of the antagonist muscle (in this patient the right internus) so that when the paralysis disappears this contracture is too great to be overcome and a concomitant strabismus results.

Discussion. Dr. William Zentmayer said that what had occurred in Dr. Reese's interesting case was probably what occurred in most cases of acquired palsy of an ocular muscle when recovery was delayed or did not take place, and explained the fact that in such instances diplopia was lost. Probably the spasm first affected the synergic muscle and later the antagonistic. For instance, in a case of paralysis of the superior-rectus muscle the synergic muscle, the inferior oblique, is first affected and for a time gives the symptoms of bilateral paralysis of the superior-rectus muscle. Later a spasm of the inferior rectus occurs.

Bilateral retinoblastoma treated by radiation

Drs. A. G. Fewell and W. E. Fry reported the case of a male child, aged 21 months. With oblique illumination the vitreous chamber of the right eye was seen to be filled with a yellowish-white nodular mass over which passed tortuous and somewhat dilated vessels. The left eye on ophthalmoscopic examination showed a fluffy white area about three disc diameters in size, with irregular margins and an elevation of about twelve diopters. The diagnosis was bilateral retinal glioma, and the right eye was removed. No masses were found in the orbit. The left eye was treated with X-ray therapy, over a period of a year, by the saturation method. The lens showed no opacities at any time, and the intraocular structures could be

easily observed. There was a marked reduction in size of the initial lesion after the first two radiations; by January 6, 1934, however, the vitreous cavity was nearly filled with tumorous masses. Enucleation was advised, and permitted on March 12, 1934. The child was last seen in July, 1934, at which time weight and development were normal. Pathological examination showed retinoblastoma in each eye. In the eye which had received the radiation, marked degenerative changes were noted; it was believed that they were produced by the X-ray treatments.

Retinoblastoma

Dr. C. E. G. Shannon presented a case of retinoblastoma, in the left eye of a baby boy, 18 months of age.

Discussion. Dr. J. Robert Andrews said he thought we should take into consideration the radiosensitivity of the various structures of the eye in the discussion of these two papers. In general, the eyelids and conjunctiva are more sensitive than cutaneous structures. Next in the order of sensitivity are the cornea, iris, and ciliary body. Irradiation of these structures may result in conjunctivitis, keratitis, and uveitis. The crystalline lens occupies a peculiar position in view of the fact that lenticular opacities may result from the effect of protracted irradiation although there may be no permanent damage to any of the other ocular structures. The retina of an adult eye can almost never be affected by doses of external irradiation which do not exceed the tolerance of the cutaneous and other structures which lie between the source of radiation and the retina itself. Many diseases of the eyelids and conjunctiva that are amenable to irradiation are not treated by these methods because of the great, and justifiable, respect in which the eye is held by radiologists. This may account, in part, for the rarity of reports of ocular damage due to excessive irradiation.

The English are attacking this problem by introducing radium needles directly into the sclera at the site of the tumor. Gold radon seeds would probably be preferable to radium needles as they could be left permanently in place. External irradiation could then be employed to build up the total dose of irradiation to such an amount as would be adequate to affect the tumor. Such a policy in the management of these cases requires the greatest coöperation between the radiologist and the ophthalmologist.

It is difficult to speak of the value of postoperative irradiation of the orbits of these patients because there is no method by which the results can be evaluated. He was inclined to the belief that it was of little value and that if there were no recurrence, the surgery had been adequate, but that if there were a recurrence, in spite of postoperative irradiation, then the surgery had not been adequate. While irradiation alone had not proved eminently successful, in the treatment of cases in which the disease could not be eradicated with complete certainty by surgery alone, irradiation might ultimately prove its value.

Dr. William Zentmayer mentioned a case of bilateral glioma in which one eye had been enucleated and a radon seed had been implanted in the remaining eye. When the child was last seen by him the enormously enlarged retinal vessels were somewhat reduced in size and the growth showed numerous lustrous areas, probably indicating cellular change.

In October, 1934, Dr. Palmer of Miami, Florida, who had referred the case to him, reported that the vessels and the growth both appeared to be smaller and that the child's vision had improved.

A comparison of tonometers for their clinical accuracy

Drs. Francis H. Adler, George E. Berner, and George P. Meyer carried out the following investigation: 1. To devise an instrument for the testing of tonometers. 2. To compare the readings of different tonometers with actual intraocular pressures. 3. To compare the readings of standard tonometers of the same make at different pressures. 4. To determine factors which cause variations in readings.

The results were: 1. The test instrument was essentially an inclined mer-

cury manometer capable of delicate adjustment, from which pressure was transmitted to an enucleated cat's eye through a needle in the eye connected to the manometer with pressure tubing filled with normal salt solution. The eye, with the cornea vertical, was supported in a brass ring. The tonometer was held in a clamp at the end of a rod which was fastened to the tube of a microscope, so the tonometer could be raised and lowered by operating the coarse adjustment of the microscope.

2. Schiötz, McLean, and Gradle tonometers were found to be sufficiently accurate for clinical purposes. Between the pressures of 20 and 40 mm. of mercury there was rarely a difference of more than 4 mm. between the actual pressure and the tonometer reading. One Bailliart tonometer was tested and found entirely inaccurate. McLean readings between 20 and 30 mm. were 3 mm. higher than Schiötz and between 30 and 40 mm. were 4 mm. higher than Schiötz.

3. Four Schiötz instruments were taken at random and compared. Between 20 and 30 mm. there was no more than 3 mm. difference in reading. At higher pressures greater inaccuracies developed, but the inaccuracy was constant for the particular instrument and when known could be allowed for in the readings.

4. For accurate readings, the plunger of the tonometer must be absolutely clean, the foot plate must rest smoothly on the cornea approximately on the center and the tilt of the instrument must not be more than 15 degrees. Weights for the Schiötz instrument should be selected so that the pointer reads between 3 and 7.

A. G. Fewell,
Clerk.

COLORADO OPHTHALMOLOGICAL SOCIETY

April 20, 1935

Dr. J. M. Shields, president

Chronic iridocyclitis after needling

Dr. W. H. Crisp presented a man, aged 60 years, who had had cataract extractions in each eye by other physicians. A hemorrhage had occurred five days after the operation on the left eye, and a secondary needling in the right eye had been followed by persistent ciliary injection with some pain and decided loss of vision. The tension was sometimes as high as 35 mm. (Schiötz), and did not vary greatly whether atropine or pilocarpine was used. There were many cells in the anterior chamber and on Descemet's membrane. Examinations as to possible sources of focal infection were negative. The vision of either eye with correction was limited to about 5/30, and the vision of the right eye, which had been the more useful eye, was gradually getting worse.

Discussion. Dr. M. E. Marcove recommended that a cyclodialysis be performed.

Dr. E. M. Reynolds reported that when the patient was seen at Colorado General Hospital, early in January, his vision had dropped from 20/40 to 20/200. A secondary membrane was clearly visible and the eye showed no sign of inflammation.

Dr. W. M. Bane suggested that the needling was perhaps just an incident in the development of a cyclitis which had probably been developing for some time prior to operation.

Dr. Charles Walker, Jr., said that he had seen several cases of a similar nature which cleared up after numerous Reese incisions.

Retinal hemorrhages in a juvenile diabetic

Dr. R. W. Danielson presented a 25-year-old medical student who had had diabetes for many years and whose case was reported in the American Journal of Ophthalmology, 1932, v. 15, p. 1181. Recently the patient had been observed by Dr. Henry W. Wagener of the Mayo Clinic who noted the tiny hemorrhages and their close relationship to the venules. Dr. Wagener also believed that a retinal arteriosclerosis was present. His blood pressure was now measuring about 150/95 and his urine was showing some albumin. He remained sugar-free on 60 units of insulin a day. The patient had in the last few years been careless about the care of his diabetes. A month before presentation he had appeared at the office for a periodic

examination and had shown a shower of tiny, round hemorrhages, most of them in the perimacular region. Since then he had taken much better care of himself and when presented only one or two hemorrhages could be found in each fundus. No white infiltrates nor exudates had ever been seen in either eye.

Dr. Danielson called attention to the fact that these small round hemorrhages were rather characteristic of diabetes. He also stressed the fact that ordinarily a retina did not show changes in diabetes, nephritis, or any other condition until the condition had lasted long enough to affect the vascular system and, therefore, young people usually did not have fundus pathology.

Discussion. Dr. Whitney Porter said that it was unusual to find diabetic hemorrhages in new cases of diabetes. In cases which he observed at Iowa City, changes in the vessels were evident in old cases of five years' or more standing.

Dr. J. C. Strong reported a case in which there were numerous flame-shaped hemorrhages in both fundi. An internist made a diagnosis of diabetic retinitis which was challenged by an oculist because of the appearance of the fundi. He also reported a case of diabetes which had improved markedly on a diet including soy-bean bread, without insulin.

Dr. Charles Walker, Sr., remarked that since the use of insulin he had not seen any of the large, severe hemorrhages which used to occur in diabetics.

Dr. J. M. Shields said that his impression had always been that the shape of a retinal hemorrhage depended entirely upon its location in the retina.

Posterior capsular cataract

Dr. R. W. Danielson presented Miss McN., 32 years old, who at the age of 17 had noticed floaters in her right eye. At that time she had been given potassium iodide and sweat baths and had had a tooth removed. One year later she developed a hemorrhage in the right eye and had an appendectomy at that time. A few years later she had spent a few months in a sanitorium as a tuberculosis suspect because of general asthenia and a positive family history. There had been no further hemorrhages in the eye.

The patient had come in recently complaining of poor vision of the right eye, diplopia for large objects, and divergence. On examination one found a right divergent strabismus varying from 5 degrees to 20 degrees. There was a definite, flaky, widespread, posterior-capsular cataract. The fundus showed various areas of retinitis proliferans, the most marked band going nasally from the disc. From this same area on the disc there proceeded forward apparently to the lens, a dark, wavy, black band that looked like a persistent canal of Cloquet. No fine vitreous floaters were discernible. The vision was 20/200. The left eye was normal in appearance and vision.

Dr. Danielson asked whether one would be justified in doing a needling of the lens or an operation to straighten the eye. He remembered having shown before the Society another case of retinitis proliferans and an apparent persistent canal of Cloquet in the same eye and wondered whether such eyes were more apt to have hemorrhages. Would the eye be liable to further hemorrhages if needled and would the eye be more likely to remain sraight?

Discussion. Dr. W. H. Crisp expressed the opinion that the band extending forward to the lens was probably scar tissue from the hemorrhage, rather than a persistent canal of Cloquet. He did not recommend any operative procedure to correct the squint whereas others did advise a strabismus operation for cosmetic reasons.

Edna M. Reynolds,
Secretary.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

May 10, 1935

Dr. J. S. Reynolds, president

Sound and hearing

Professor Henry Hartig, of the Department of Electrical Engineering at the University of Minnesota, gave a talk on this subject.

Nonsurgical reattachment of iris in a case of traumatic iridodialysis

Dr. V. J. Schwartz (Minneapolis) reported the case of a boy, aged 13 years, who on July 4, 1929, suffered an injury to his left eye. An iridodialysis of about 6 to 7 mm. in length developed above. Atropine was instilled within two hours of the accident. The pupil dilated and the torn periphery of the iris became reattached to the ciliary body. This had remained so since.

The author knew of only one other similar instance, although it was possible there might be more. Almost all authorities regarded such a reattachment as impossible.

Discussion. Dr. C. N. Spratt (Minneapolis) stated that, in spite of the frequency of automobile accidents, iridodialysis was not a common condition. He said he had seen a large number of cases in which separation of the iris had been made intentionally following the method of operation for glaucoma in which he had combined iridodialysis with the Lagrange operation. Out of some 75 cases, five or six reattachments of the iris had taken place.

Dr. Schwartz (in closing) said he knew that Dr. Spratt performed iridodialyses in his Lagrange operations, but these were very small. A tear of 2 or 3 mm. was quite a different thing from one of 7 mm. and it was easy to understand how the small one might heal.

Unusual cataract complication, 40 years after operation

Dr. V. J. Schwartz presented a man who was born with congenital cataracts 48 years ago. The right eye had been enucleated in childhood. The left eye was successfully needled 40 years ago, vision with a lens being 20/30.

About six weeks ago a crescentic piece of lens capsule prolapsed through the pupil. The temporal end was apparently still attached to the zonule behind the iris. The nasal end of this membrane was lying free at the bottom of the anterior chamber, yet through a small elliptical aperture beneath this membrane the patient could still see 20/30.

Prosthesis worn over an infantile eye for 25 years

Dr. H. O. Cooperman (Minneapolis) reported the case of D. M., aged 40 years, who complained of a thick discharge, of two months' duration, from the left eye socket. He stated his mother had told him that when he was nine months old he could not open his eyes and the local physician in a small Russian village had enucleated the left eye in order to save his right eye. At the age of 15 years, he began to wear an artificial eye.

The orbit was well developed. Beginning at the lid margin, in the superior nasal angle, a flat elevated inflamed mass of tissue, about 5 mm. wide and 12 mm. long, extending backward and inward, was distinctly visible. In the orbit lay a small shrunken globe, scleral white in color, with an irregularly shaped bluish discoloration in the center of a linear scar extending across the globe. The shrunken globe followed the right eye in movement.

A microscopic section of the growth showed thickening of the epithelium, diffuse lymphocytic infiltration, many blood vessels and fibrous tissue. The diagnosis was chronic inflammation. There was no evidence of malignancy.

This condition was of interest because it was rare, because the bony orbit had developed while the eye remained infantile, and because of the length of time during which the infantile eye had been covered by an artificial eye without any ill effects to it or to the normal eye.

Walter E. Camp,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section on Ophthalmology

June 14, 1935

Mr. Ransom Pickard, president

Bilateral conical cornea; contact-glass correction

Mr. A. Rugg-Gunn showed a man from South Africa, aged 22 years, whose eyes had been affected since he was 12 years old. More than four years ago his right vision was 4/60, left about 1/60. Last February, the vision had been

O.D. 2/60, O.S. 1/60. With appropriate contact glasses the vision was O.D. 6/12, O.S. 6/18. Within a fortnight of receiving his contact glasses the patient was wearing them continuously for four hours, and in four or five weeks was wearing them eight or nine hours a day.

Discussion. Mr. J. Gray Clegg said that recently, in company with members of the North of England Ophthalmological Society, he saw in Budapest, a demonstration of the method of Dallos. By molds each glass was individually formed for the eye. The contact glass was tight in one direction, and fitted loosely in another, so as to allow of movements of the globe. Patients were shown who wore their glasses from morning till night, and some of them had high myopia.

Mr. A. G. Paling suggested the need for tinted contact glasses in some cases.

Mr. Rugg-Gunn said that in all Dallos's work the optical glass was ground; in the early part of his work Dallos did try blown glass, but had discarded this method long ago. As to the time of wearing the glasses, Mr. Rugg-Gunn always advised patients to take them off at the end of four hours, at the most, and usually he found that meal-times were chosen for this. Three 4-hour periods of wearing usually sufficed to carry the patient through the day.

A type of congenital optic atrophy differing from Leber's disease

Mr. G. T. Willoughby and Dr. A. Hugh Thompson stated that this condition differed from Leber's disease in the following particulars: (1) in Leber's disease the age of onset was about 20 years, and all these cases were congenital; (2) out of eleven cases in four generations, five were males, six females; Nettleship's figures for Leber's disease were 300 males and 60 females; (3) inheritance was always through the affected mother, never through an unaffected mother or through the father; in typical Leber's disease it was through an unaffected mother; (4) the condition appeared to be stationary after birth; in Leber's disease the prognosis was not so grave; of the 18 known members of this pedigree, seven were not affected, eight were blind, and three had some useful vision with some stationary contraction of the fields; (5) in nearly all the cases seen, the discs were of a pearly whiteness. This was so, even in the case of those who had some useful vision; (6) in spite of a central scotoma, as in Leber's disease, there was a concentric contraction of the fields; (7) in all the cases in this family that had been examined, nystagmus, though not necessarily constant, had been present. Except for the optic atrophy and narrowing of vessels in some cases, no other ophthalmoscopic changes were present; (8) in the affected members, no other congenital anomalies had been noted. There were no known congenital abnormalities in relatives. (9) There was no consanguinity.

The use of adrenaline in atropine and hyoscine irritation

Mr. Eugene Wolff said that most ophthalmic surgeons had had cases in which the use of a mydriatic was imperative, and yet atropine, hyoscine, Duboisin, etc., all caused irritation. Many suggestions had been made with a view to overcoming this. Sometimes changing the supply of the drug by obtaining it from a different chemist might be successful. Waller had recently shown that it was possible to immunize patients against atropine irritation by injecting, subcutaneously and repeatedly, a combination of atropine and protein in the form of tears. But it might take some weeks for this to have effect, and in the interval it might be necessary to continue the use of the mydriatic. A simple expedient proved to be helpful in the following case: A patient who had had a discission after a cataract extraction, suffered from atropine and hyoscine irritation: the skin of the lids was dry, red, and swollen. Adrenalin was dropped into the conjunctival sac and on the skin of the lids. Zinc-oxide cream was applied to the lids, and then hyoscine was instilled. On the next day the skin was found to be practically normal. By this means hyoscine was continued for a week without trouble.

(Reported by H. Dickinson).

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REFRACTION IN EUROPE AND AMERICA

Visiting European clinics, many American ophthalmologists have reluctantly gathered an impression that refraction on the European continent (as distinguished from the British Isles) was usually on a much lower plane than in the United States.

The old prejudice against the wearing of glasses, except in case of extreme necessity, is still much more prevalent on the eastern side of the Atlantic. In many cases of convergent strabismus associated with hyperopia no attempt is made at the wearing of a refractive correction. Patients with important amounts of myopia quite commonly wear glasses only for brief intervals, and many such patients do all close work without glasses. Even after recognition of important fractions of astigmatism, such as in the United States would be regarded as productive of eyestrain, it appears a frequent practice to prescribe only a spherical correction, ignoring the cylindrical.

Economic circumstances are of course partly, although by no means wholly, responsible for this neglect of the art of refraction. Fewer citizens of continental Europe can afford to pay for painstaking work on the part of the refractionist. The low esteem in which the prescription of glasses has been held in one European country at least is indicated by the fact that seven years after the end of the World War the customary fee for this service in important provincial cities of the German Reich was stated to be six marks (at that time equivalent to a dollar and a half)!

In a recent issue of a German eye journal (Zeitschrift für Augenheilkunde, 1935, volume 87, page 37), Max Herzog, who has evidently spent some time in the office of a well-known American ophthalmologist, gives a fairly detailed account of American refractive technique as he has seen it.

He credits this country with extraordinary precision in refractive method, such as perhaps appears exaggerated to Europeans. This he explains as attributable to the conditions of American life, with its general restlessness, strenuous competition, and the spirit of rivalry, with consequent general nervousness and its reactions on various bodily functions. Americans, he says, are distressed at the thought that any organ is not working at 100-percent efficiency. The possession of full visual acuity has a much greater significance for them than for Europeans. In other words they are "eye-conscious."

Customary procedures which Herzog describes include the fogging method, the use of astigmatic charts or the cross cylinder, homatropine cycloplegia for adults and atropine cycloplegia for young children, retinoscopy under cycloplegia (Lindner's cylinder skiascopy being highly esteemed), a postcycloplegic test, and subsequent control as to the correctness of the glasses furnished by the optician to the patient. Some attention is given by the author to the part played in the United States by the optometrist—a calling which Herzog says does not exist in Germany.

As to the ordering of glasses, the author comments on the fact that for hyperopia distance glasses are ordered more frequently than in Europe. Unilateral amblyopia is also more generally corrected. Herzog also notes the importance attached to correction of even slight amounts of astigmatism, especially against the rule, when any sort of related symptoms are present. Another fact particularly mentioned is that in the United States it is customary to correct the full amount of astigmatism measured, even in high errors, such corrections being usually well tolerated.

Most of us on this side of the ocean will approve Herzog's statement as to the demonstration by experience that particularly the correction of low astigmatic errors gives relief from asthenopic symptoms. Perhaps the failure of the European ophthalmologist to obtain similar results, and the impression of our European colleagues that the good effect in these cases is simply due to suggestion, depend upon European lack of refinement in refraction rather than upon the nerve tension, the "eye-consciousness," and the suggestibility which our European friends are disposed to attribute to the typical American patient. W. H. Crisp.

ADAPTATION AND PHOTOPHOBIA

On sudden exposure to bright light, the pupil quickly contracts. This is a light reflex—the reaction by which we test the sensitivity of the retina, to find if an eye will be benefited by removal of a cataract. It occurs very quickly, and adapts the eye to light by shutting out most of the light that would be concentrated on a certain part of the retina. On passing into complete darkness the pupil swiftly dilates, and reaches its maximum size in a few seconds. This is the pupillary mechanism of adaptation, which varies considerably in different animals.

Apparently present in all animals that have good sight, there is also a nervous mechanism of adaptation that adjusts the sensitivity of the eye to secure the best vision in any particular brightness of light to which the eye is exposed. This "retinal adaptation" is a much slower process. Many observers, by careful laboratory experiments, have measured the time required for dark adaptation; the time it takes for the retina to reach its highest degree of sensitivity in comparative or complete darkness. The complete adaptation of the eye to darkness is a slow process. All observers agree that it takes from one to two hours to reach the maximum retinal sensitivity for feeble illumination.

Adaptation of the retina to maximum illumination has not been so studied; and probably cannot be studied by the same exact methods of the laboratory. But, observed by the usual methods of personal comfort and visual efficiency, retinal light adaptation is also a relatively slow process, as compared with pupillary adaptation. The flashlight, for taking an instantaneous photograph, is unpleasant to those who are facing it. The sensation from a bright electric

lamp, suddenly turned on in a dark room, is not agreeable. A flickering light, varying much in brightness from instant to instant, is very unpleasant and unfavorable for visual efficiency. We see better and more easily by a steady light than by one that is variable, even though it may be, intermittently, much brighter. It is the steadiness of the light from the incandescent filament that makes it superior to the flickering arc lamp, or to the light of a leaping flame.

We must conclude that retinal, or neural, adaptation to light is a slow process, originally evolved to meet the slow changes of dawn and twilight. The beginning of dawn may be seen in the east an hour before sunrise and twilight lingers in the west an hour after the sun sets. So gradual is the change that we cannot fix the time when it begins or ends, and at no time is vision interrupted, or made a source of discomfort. So gradual is this change of light, so perfectly adapted to it are our visual processes, that it can go on day after day without attracting attention from the various things in which we are engaged. It may be a source of danger when one starts to read something in a fading light or tries to complete a piece of fine work before the light is gone. It is effective for preventing unnecessary interruptions by natural changes in illumination. But it tends to mask the reduction of light to a level that is insufficient for the best vision.

The safeguard against excessive light, or any sudden increase of light above that for which the eye is adapted, is photophobia, a disagreeable sensation produced by light stronger than that for which the eye is adapted. When adapted to complete darkness the flashing on of a 100-watt lamp may be disagreeable, but when the eyes have been adapted by watching the dawn, we can look steadily at the sun gradually coming up, without any unpleasant sensation; and many have watched the sun set, with eyes adapted to daylight, with feelings of enjoyment. It is not the brightness of a light, but the suddenness of its being made bright, that is disagreeable.

But in the dictionary, phobia is defined as "a morbid fear or dread." Photophobia, the dread of light, may easily become morbid. The mechanism of light adaptation has not been thoroughly studied, and is not fully understood. Many conditions may contribute to photophobia. Eye fatigue, poor nutrition, as by anemia, inflammation within the eyeball, may all produce, or increase, the dread of light. But the most common cause, and the cause of the cases of pathological photophobia, is avoidance of exposure of the eyes to normal daylight. Photophobia is a weakness of the power of light adaptation. It may be compared to loss of muscular strength by lack of exercise. The processes of nutrition are closely parallel in nerve cells and muscle cells, and the development of muscle strength and associated nerve strength, by regular and graduated exercise, is well understood by the trainers of race horses, base-ball teams, or prize-fighters.

The development of retinal, or neural, light adaptation must be carried on in the same way, and over equally long periods. Not for a few days, or intermittently, or without effort on the part of the patient, but daily, earnestly, persistently for months, or years, until light adaptation to strong daylight becomes one of the habits of life.

Edward Jackson.

THE ST. LOUIS MEETING OF THE SOUTHERN MEDICAL ASSOCIATION

On Sunday, November 17th, the largest group ever to attend a convention of the Southern Medical Association began to arrive. Almost four thousand names were registered. Following a succession of rainy days, the weather cleared on Tuesday and remained fair throughout the session.

On Monday, the American Board of Ophthalmology examined forty-five candidates at the McMillan Hospital and the Oscar Johnson Institute. As we have commented previously in the Journal, each year the candidates present themselves better prepared than in

the foregoing year. This is especially true of the young men and women and suggests that better opportunities for training are being offered by the ophthalmic institutes of this country.

A unique feature of the program was "St. Louis Day." Tuesday was so designated and on this day all sections were given over to local physicians. The Eye, Ear, Nose, and Throat Section program was divided equally between eye and ear, nose and throat, and also equally between Washington University and St. Louis University. Although possibly writing from a prejudiced viewpoint, the editor considers the discussions to have been well worth while. The departmental heads had urged that at least a part of the day be spent in the various institutions where demonstrations of the actual work being done could have been given; for it is obviously impossible to present this as clearly and interestingly in a lecture as when surrounded by the apparatus used and the subjects of the experiments. The directors of the Association, however, preferred the didactic method, and so there was nothing except the personnel of the speakers that characterized the performance as typical of St. Louis. Nevertheless, presentations were a little different from the usual run of convention papers and perhaps a little more profitable.

As to the routine section program, the editor has expressed himself on this subject before. The caliber of the papers was good, but it is not possible to do more than to scratch the surface of any but the simplest subjects in twenty minutes. Of especial importance and exceedingly valuable was the talk on plastic surgery by Dr. John M. Wheeler, the honor guest of the Section. It was a splendid lecture, clear, concise, instructive, and beautifully illustrated. The speaker was allowed an hour, which went by far too quickly.

So-called round-table sessions were held on Wednesday and Thursday afternoons. The editor heard only the ophthalmological program and thought it excellent. The name seemed somewhat of a misnomer, for the meeting was held in a convention hall. We regretted this, as we like the idea of a luncheon followed by a table talk. There is a pleasing informality about it, and usually an open and unrecorded discussion that develops interesting points and permits a better acquaintance with the speaker. This session should be leisurely, but not too long; just a minor attempt to combat the present-day obsession to cram forty-eight strenuous hours into every twenty-four, productive chiefly of high blood pressure.

The meeting closed officially on Friday at noon. However, there were laboratory and surgical demonstrations on that afternoon for those who chose to remain a few hours longer.

The next meeting place will be Baltimore, which should be very attractive to ophthalmologists because of the Wilmer Institute in that city. It is hoped that the arrangement committee will authorize that a part of the ophthalmological program be held in that famous institute.

Dr. Fred M. Hodges of Richmond was elected president and Dr. Quitman U. Newell of St. Louis, vice-president. We may look forward to a splendid gathering next year.

Lawrence T. Post.

BOOK NOTICES

An outline of ophthalmology. By Sanford R. Gifford. Paper binding, 84 pages, 105 illustrations (half tones and etchings). Published by Edwards Brothers, Inc., Ann Arbor, Michigan. Price $1.50.

This is a paper-covered photostatic copy from typewritten sheets of lectures for medical students in ophthalmology. The subject is very well covered, being obviously the product of much thought. The figures are instructive and well chosen. It is just the right thing for undergraduate teaching of ophthalmology and would adequately provide a course of fifteen lectures. The simple composition permits its sale for a reasonable price so that it could be purchased by every student. From it the

relationship of ophthalmology to general medicine can easily be stressed, thus fulfilling the function generally considered desirable for undergraduate ophthalmological teaching. We are indebted to the author for a most convenient handbook.

Lawrence T. Post.

CORRESPONDENCE

The action of Levo-glaucosan

Editor, American Journal of Ophthalmology:

Inadvertently, a mistake was made in the paper entitled "The lid-closure reflex of the pupil," written by Dr. Benjamin Boshes and me, and published in the November, 1935, issue of the Journal.

The first sentence on page 1049 should have read: "Levo-glaucosan, a German preparation of histamine, acts directly on the muscle fibers, causing a maximal dilation of the pupil."

Will you be kind enough to call attention to this mistake in your next issue?

(Signed) Leo L. Mayer.

November 25, 1935

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Motolese, A., and Jablonski, W. **Relations between ophthalmology and experimental psychology.** Boll. d'Ocul., 1935, v. 14, March, pp. 317-327.

The "form theory" is the basis for a dissertation on phenomena which are evolved in the central nervous system in connection with ocular functions. The new theories are in marked contrast to the traditional doctrines of the classic school led by Helmholtz. (Bibliography, 14 figures.)

M. Lombardo.

Pfimlin, R., and Strübin, F. **Investigations on the process of binocular vision.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 223. (Ill.)

For determining the direction of the visual axes in binocular vision the prism diopter has been taken as a general unit, that is a 1-cm. deviation of the ray by a prism from the original direction at a distance of 100 cm. The mode of calculation for distances less than 100 cm. is explained and the formula given. The experiments demonstrated that total vergence is the sum of two components, called accommodative and fusional vergence. The amount of these depends upon the effort of accommodation and the connection can be graphically represented. A standard curve for different refractions was established. C. Zimmermann.

Pflugk, Albert. **The problem of accommodation. Remarks on the articles of Nicolai and Strebel.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 369.

Pflugk criticizes Nicolai's theory (see Amer. Jour. Ophth., 1935, v. 18, p. 980) and welcomes Strebel's acceptance of his experimental proof of tension of the zonular fibers during accommodation (see below). C. Zimmermann.

Prigoshena, A. **Staphyloma verum.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 876.

Staphyloma verum is frequently seen in myopes of over twenty diopters. It is not found in cases with atrophic choroidal changes nasally from the disc. It is produced by localized distention of the ocular wall, caused perhaps by rupture of the lamina vitrea and asymmetric development of the eyeball.

Ray K. Daily.

Strebel, J. **The mechanism of accommodation and the action of the three systems of ciliary muscle fibers, as refuting discontinuity theories.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 235.

Strebel discusses the contradictions in Helmholtz' theory of accommodation and rejects the theories of discontinuity. He sees the solution of the problem in measuring the elasticity of the zonule and lens capsule.

C. Zimmermann.

Strebel, J. **A simple model for demonstration of Pflugk's measurements of zonular elasticity and lens resistance and for refuting of Helmholtz' theory of accommodation.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 247.

The model is described and its purpose discussed. C. Zimmermann.

Tinker, M. A. **Illumination intensities for reading.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1036-1039.

4. OCULAR MOVEMENTS

Garcia Miranda, A. **The treatment of strabismic amblyopia and its results.** Arch. de Oft. Hisp. Amer., 1935, v. 35, Aug., pp. 393-403.

Of 32 cases treated in Schieck's clinic at Wurzburg, 21 were treated with occlusion bandage of the fixing eye followed by orthoptic training.

In children less than ten years old, vision improved considerably, to ten times the initial vision. In children of more than ten years, vision at the end of the treatment was only three or four times more than at first. Binocular vision was obtained in fifty percent. In eleven cases in which occlusion failed to improve vision, operation was required for cosmetic purposes, and was followed by occlusion and orthoptic training. In this group, the vision in children of less than ten years showed an improvement of 21 times over the initial vision. Binocular vision was obtained in three-fourths of the children of this group. (Bibliography.)

R. Castroviejo.

Hicks, A. M., and Hosford, G. N. **The orthoptic treatment of squint.** Trans. Western Ophth. Soc., 1st annual meeting, 1934, p. 37. (See Amer. Jour. Ophth., 1935, v. 18, Dec., p. 1162.)

Horay, Gustav. **Experiences in 700 muscular advancements.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 289. (Ill.)

The technique of operation used within the last nine years is described in detail and the results tabulated. The shortening of the muscle counts more than the advancement. It is found anatomically that the muscle mostly becomes attached to the tendon stump and not between this and the limbus.

C. Zimmermann.

5. CONJUNCTIVA

Anelli, Dantes. **The nictitating membrane in the animal series.** Boll. d'Ocul., 1935, v. 14, April, pp. 499-516.

The anatomic structure of the third lid of 29 animals was studied. Some contained glands of the acino-tubular type, having the same function as meibomian glands. It contained cartilage in some and muscular elements in other animals. In some birds there is a bimarginate arrangement and in other birds the exterior surface shows a keratinized epithelium similar to the skin. (Bibliography, one figure.)

M. Lombardo.

Balza, J., and Yalour, R. R. **Local autohemotherapy in the treatment of trachoma.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 502.

Local autohemotherapy, or subconjunctival injection of 1 c.c. of the patient's own blood, has given the writers excellent results in pannus and corneal ulcer. The effect on the granulations has not been striking but there was general relief from photophobia. The blood is absorbed in from ten to twelve days, and the injection may be repeated every three or four days.

M. Davidson.

Bossalino, Giuseppe. **Leucocytic formula in trachomatous patients before, during, and after autohemotherapy.** Boll. d'Ocul., 1935, v. 14, Feb., pp. 225-235.

Hematologic examination in 25 patients affected by trachoma showed hyperactivity of lymphatic organs, characterized by neutropenia compensated by lymphocytosis, monocytosis, and eosinophilia. The writer believes that the constitutional factor may be an indispensable condition for contracting trachoma, and at least facilitates its development, aggravates its symptomatology, and delays its recovery.

Hemotherapy, by helping the blood formula, improves the defense against trachoma. (Bibliography, 3 tables.)
M. Lombardo.

Brecher, L. **Treatment of trachoma with trachocid.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 372.

Trachocid, a biologic derivative of animal virus (serpent and bee) is absolutely harmless and painless. With subconjunctival injections Brecher had good results in the treatment of trachoma. A case is reported in which trachocid cleared up an inveterate pannus.
C. Zimmermann.

Busacca, Archimede. **A germ with the characteristics of Rickettsia (Rickettsia trachomatis) in trachomatous tissue.** Arch. d'Opht., 1935, v. 52, Aug., p. 567.

The author points out that Cuénod, in a preliminary note on the presence of inframicrobic bodies in trachoma follicles (see Amer. Jour. Ophth., 1935, v. 18, p. 985), did not mention Busacca's work on the same subject (see Amer. Jour. Ophth., 1935, v. 18, p. 277). The author claims that he was the first to demonstrate these bodies but that his work has been ignored. (Illustrations.)
Derrick Vail.

Cuénod, A., and Nataf, R. **Second note on the presence of inframicrobic elements in trachoma follicles.** Arch. d'Opht., 1935, v. 52, Aug., p. 573.

These bodies, which are found in great abundance in all pure trachoma cases, cannot be shown by ordinary staining methods nor can they be cultured. They are only visible following fixation by the May-Grunwald method or by Azur II, followed by Giemsa staining. Here they are seen as points which are round or slightly oval, representing probably not the organism itself but its envelope. One finds these bodies in all intact epithelial cells, but especially in the abundant débris of these cells. To this débris, which is scattered in large quantities between the cells, the authors give the name plastilles (plasma droplets). In Giemsa preparations these droplets appear blue violet, while the nuclei of the cells are rose violet. Busacca is given full credit for anticipating their work. By using cyanochine, a stain used for the identification of rickettsia, the authors have been better able to demonstrate and study the bodies. (Illustrations.)
Derrick Vail.

Gifford, S. R., and Lazar, N. K. **Inclusion bodies in ophthalmia neonatorum.** Further note. Arch. of Ophth., 1935, v. 14, Aug., pp. 197-202.

A two-percent infusion of senega was applied to the apparently normal conjunctiva of 26 infants. Inclusions identical with those of inclusion blennorrhea were found in scrapings from three cases. Twenty-seven more infants were treated in a similar manner, but no inclusions were found. It is thought that the virus of inclusion blennorrhea existed in a latent or nonvirulent form on the conjunctiva of those eyes in which inclusions were present, and that the use of a chemical irritant stimulated its growth so that it was easily found. (Photomicrographs.)
J. Hewitt Judd.

McKee, S. H. **A study of the pneumococcus group from the inflamed conjunctiva and lacrimal sac.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1021-1029.

Ochi, S. **A kind of microorganism in trachomatous tissue.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 193.

Ochi reports in detail seven cases which he inoculated successfully with trachomatous material. He found the same kind of microorganisms in the infected and infecting tissues.
C. Zimmermann.

Panico, Emanuele. **Biomicroscopic aspect of normal and pathologic epithelial tissue of the conjunctiva.** Boll. d'Ocul., 1935, v. 14, April, pp. 491-498.

With the slitlamp the epithelial tissue may be studied at the fornices, around a glandular orifice, at the lacrimal puncta, and in the caruncle. The writer describes keratinic degeneration,

vacuolar degeneration, the aspect of the structure in wounds of the conjunctiva and during cicatrization, in inflammatory conditions, in fatty degeneration, and in epithelial tumors of the conjunctiva. (Bibliography.)

M. Lombardo.

Puscariu, E., and Lazarescu, D. **Considerations on eczematous keratoconjunctivitis in the ophthalmic clinic of Jassy.** Boll. d'Ocul., 1935, v. 14, April, pp. 465-478.

Eczematous keratoconjunctivitis was studied in relation to tuberculosis; 684 patients being examined, 398 of them between five and twenty years of age. Lack of proper nutrition and hygienic life, especially important at these ages, was a predisposing factor. In 338 patients there was adenitis, tracheobronchial adenopathy, or pulmonary, cutaneous, or osteo-articular tuberculosis; while 270 out of 314 gave a positive tuberculin reaction, 203 of these being below twenty years. (Bibliography.) M. Lombardo.

Soria, M. **Tuberculosis of the conjunctiva.** Arch. de Oft. Hisp. Amer., 1935, v. 35, June, pp. 322-326.

The author reports a case of primary tuberculous infection of the tarsal conjunctiva. There was marked swelling of the preauricular gland. Culture of the pus removed from the gland revealed tubercle bacilli, and animal inoculation developed typical tuberculous lesions. A piece of affected conjunctiva showed the histologic structure of tuberculous lesions, but the Koch bacillus could not be demonstrated. (2 illustrations.)

R. Castroviejo.

Szily, A. **Contribution to the etiology of so-called Parinaud's disease.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 315. (Ill.).

A woman aged 24 years showed clinically all the characteristics of true Parinaud's conjunctivitis due to bovine tuberculosis. The differential diagnosis between true Parinaud's and tuberculosis is discussed. To the clinical diagnosis of Parinaud's conjunctivitis the respective etiologic terms, referring to Bacterium pseudo-tuberculosis rodentium or tularense, or to bovine tubercle bacilli, should be added. The observation of Parinaud that the disease chiefly affected people who came in contact with animals seems to hold good for almost all the cases.

C. Zimmermann.

Van der Straeten and Appelmans. **Ocular pemphigus.** Arch. d'Opht., 1935, v. 52, Aug., p. 545.

Ocular pemphigus may accompany any acute or chronic pemphigus of the skin or other mucous membranes, or may exist without any other localization of the disease. The characteristic bullae often escape notice because of their rapid rupture. The authors report in detail a case which they followed from the beginning for three years. It occurred in a young single woman presenting acute generalized pemphigus of the skin and mucous membranes of the mouth, nose, vulva, and especially conjunctiva. An exhaustive review of the literature is given, covering history, etiology, pathology, symptomatology, and diagnosis. The prognosis is always grave, and treatment, both general and local, is without much success.

Derrick Vail.

Vila Ortiz, J. M., Jr. **The role of vagosympathetic imbalance in the etiology of spring catarrh.** Arch de Oft. Hisp.-Amer., 1935, v. 35, June, pp. 316-322.

This is a preliminary report. In 31 cases of spring catarrh the author has found different degrees of imbalance of the sympathetic system.

R. Castroviejo.

6. CORNEA AND SCLERA

Anelli, Dante. **Extract of lacrimal gland in the repair of corneal ulcers.** Boll. d'Ocul., 1935, v. 14, March, pp. 352-359.

Instillation of an extract of horse lacrimal gland in the conjunctival sac of nine rabbits the cornea of which had been infected with a culture of staphylococcus and pneumococcus or

staphylococcus and streptococcus shortened the period of recovery from ulcers following the infection. The installation was used three times daily. The period of recovery was longer if the instillation was used only once daily, and in control rabbits in which none of the extract was used recovery began when the corneal ulcers in the other rabbits were in an advanced stage of repair. (Bibliography.) M. Lombardo.

Biozzi, G., and Lugli, L. **Ring-shaped peripheral thickening in the region of Descemet's membrane.** Graefe's Arch., 1935, v. 134, p. 287.

In sixteen young individuals this familial and hereditary change was observed with the slitlamp. The condition consists of a delicate peripheral folding on the posterior surface of the cornea, not forming a complete circle although parallel to the limbus. It was never observed in the upper quadrant of the cornea. H. D. Lamb.

Bonnet, P. **Palm-leaf corneal opacities, remnants of interstitial keratitis (annular type of Vossius).** Arch. d'Opht., 1935, v. 52, Sept., p. 625.

The author presents the drawings of vascularization of the cornea in six patients. "Palm-leaf" keratitis is seen as a whitish disc, opalescent and sharply defined, situated in the deep layers of the cornea. The disc is divided by a sort of hilum arising from the limbus. The vessels form the ribs of the "fan" or "palm leaf." The opacity is considered as pathognomonic of hereditary syphilis. (Illustrations.)

Derrick Vail.

Castroviejo, Ramon. **Keratoplasty. Clinical study of fourteen cases. The cornea of the fetus as material for transplantation.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Aug., pp. 404-434.

The author describes different techniques of transillumination which may be used to examine eyes affected with corneal opacities. His operation, partial penetrating keratoplasty, is described in detail, and fourteen cases are reported. In nine cases the transplant was obtained from eyes enucleated on account of conditions which left the cornea normal or almost normal (homotransplants). In one case the normal cornea of a blind eye was implanted in the leucomatous cornea of the second eye of the same patient (autotransplant). In four more cases the implant was obtained from the eyes of still-born infants, enucleated shortly after delivery and kept from five to 72 hours in serum of the patient or Ringer solution, at a temperature of 2°C. above zero. Improvement of vision after operation was obtained in ten cases. The least improvement was from light perception and projection to counting fingers at two feet; the greatest from hand motion at one foot to 20/30.

R. Castroviejo.

Esteban, M. **Some details in the Denig operation.** Rev. Cubana Oto-Neuro-Oft., 1935, v. 4, May-Aug., p. 90.

In the Denig operation, which the author uses frequently and with good results in trachomatous pannus, the following technique is found of advantage. No conjunctiva is excised, retraction by the blepharostat being sufficient to pull the conjunctiva away. Sutures are passed into the buccal transplant before its separation, to facilitate handling. (Illustrated.)

M. Davidson.

Fiore, Tito. **Researches on the chemistry of argyrosis.** Boll. d'Ocul., 1935, v. 14, March, pp. 360-370. (See Section 16, Injuries.)

Friede, Reinhard. **Corneal homoplastin or autoplasty.** Zeit f. Augenh., 1935, v. 87, Aug., p. 15.

Further experience convinces Friede of the superiority of autoplasty over homoplasty. In one case the former succeeded after a failure with the latter. The automatic trephine, a necessary instrument, is in need of refinement. It is essential to thoroughly anchor the graft, and the author uses a double cross of silk suture through the conjunctiva. Once he was forced to put sutures into the graft and cornea and the operation was successful. He does

not use a tobacco-pouch suture because complete dissection of the conjunctiva causes, in his opinion, too great disturbance of corneal nutrition.

F. Herbert Haessler.

Galeazzi, Cesare. **Imperfect osteogenesis and blue sclera.** Boll. d'Ocul., 1934, v. 13, Dec., pp. 1602-1618.

The author reports five cases with lesions of the bony system due to abnormal osteogenesis, with typical blue discoloration of the scleras. All were in females, the oldest being 22 years of age. Four patients were members of two related families. One of the patients had hypocusia. With the exception of the blue scleras the ocular apparatus was normal in each case. (Bibliography, 9 figures, 2 in color.)

M. Lombardo.

Kazas, I. I. **Etiology of Hutchinson's keratitis.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 848.

Commenting on Dvorczetz' article on ocular complications of grippe, in which Dvorczetz mentions parenchymatous keratitis as one of the complications, Kazas holds that this statement was made on insufficient evidence.

Ray K. Daily.

Lijo Pavia, J., and Dusseldorp, M. **Marginal keratitis with ectasia.** Rev. Oto-Neuro-Oft., 1935, v. 10, Aug., p. 210.

In this rare case of unilateral involvement, without vascularization, neither a diagnosis of luetic parenchymatous keratitis, nor of marginal dystrophy with ectasia of the cornea, nor of bullous keratitis fitted the picture. Ovarian hypofunction was present. Recovery was spontaneous. (Illustrated.)

M. Davidson.

Lugli, L. **"Oil-globule" degeneration of the cornea.** Graefe's Arch., 1935, v. 134, p. 211.

The clinical, biomicroscopic, and pathologic findings in nine cases are reported in detail. The condition is characterized by opacity of the corneal epithelium and by many small round subepithelial foci, the latter more numerous and coarser in the periphery of the cornea. The foci are canary-yellow by direct light, amber by transmitted light. The opacity in the corneal epithelium is confined to the periphery. Formations like drops of oil are found in Bowman's membrane and in the more superficial lamellae of the substantia propria. The course of the degeneration is slowly progressive without a sign of irritation or of a cyclitic inflammation. All the individuals affected were over sixty years of age. Five had had senile cataract, one had glaucoma, and two showed the remains of old iridocyclitis. The disorder affects both eyes and begins at the nasal and temporal margins of the cornea.

H. D. Lamb.

Puglisi-Duranti, G. **Spindle pigmentation of the posterior surface of the cornea. (Krukenberg spindle.)** Arch. di Ottal., 1935, v. 42, May-June, p. 183.

Three cases of Krukenberg's spindle are described, in two of which the refractive error was hypermetropic. Biomicroscopically the pigment was found to be intracellular and the author is of the opinion that there is an endothelial dystrophic alteration in such cases.

Herman D. Scarney.

Ralli, E. P., Gresser, E. B., and Flaum, G. **Effect of experimental diabetes on the cornea of dogs. Its relationship to the administration of vitamin A.** Arch. of Ophth., 1935, v. 14, Aug., pp. 253-262.

The eyes of four normal dogs and two with the pancreatic ducts ligated showed no pathologic changes regardless of the amount of vitamin A in the diet. Five depancreatized dogs showed corneal changes, primarily those of keratinization of the epithelium and swelling of the endothelium. These had received no vitamin A with one exception, in which cod-liver oil was given after the dog had been diabetic for 33 days. The two diabetic dogs not showing corneal changes were evidently protected against this condition by an ample supply of vitamin A. In both normal and depancreatized dogs the amount of vitamin found in the liver

corresponded to the amount fed, but the symptoms in the depancreatized animals suggested a relative deficiency of vitamin A. (Photomicrographs.)

J. Hewitt Judd.

Siegert, Peter. **The symptomatology of keratitis pustuliformis profunda.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 89.

The author describes four atypical cases. The first was in a woman. Hypersensitivity developed to the first large dose of salvarsan. In the second case hypopyon and iritis increased after the first two small doses of salvarsan. This was interpreted as a Herxheimer reaction and was avoided in later experience by using a very large initial dose. The last two cases were not clearly characteristic. The clinical course or history strongly suggested congenital syphilis. Diagnosis was based on the abscesslike opacity and immediate response to salvarsan. In a fifth patient the diagnosis was doubtful.

F. Herbert Haessler.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Boshes, Benjamin, and Mayer, L. L. **The lid-closure reflex of the pupil.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1048-1051.

Davies, W. S. **Uveitis with associated alopecia, poliosis, vitiligo, and deafness.** Arch. of Ophth., 1935, v. 14, Aug., pp. 239-243.

The clinical findings in the 21 cases previously reported are summarized and the various theories of etiology are reviewed. The disease is strikingly similar to sympathetic ophthalmia both in ocular findings and in associated complications. Treatment is the same as in the usual case of uveitis. In the case reported, a man aged 31 years presented bilateral uveitis with vision reduced to light perception. He had alopecia, poliosis, and deafness, but no evidence of vitiligo. (Photograph.)

J. Hewitt Judd.

Ludwig, Alfred. **Angioma of the choroid with nevus of the temporal region.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 168.

In a woman of 28 years a diagnosis of angioma of the choroid was based on angioma of the skin of the temple, age, coarse configuration of the choroidal vessels, defective pigmentation of the area of the tumor, pigment streaks reminding one of those observed after reattachment of the retina, flat retinal detachment, a corresponding defect of the visual field, opacities of the vitreous, lack of marked diascleral shadow, and distinct diaphanoscopic contrast.

C. Zimmermann.

Meyer-Waldeck, F. **Technique of autohemotherapeutic blood injections into the anterior chamber.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 250.

The author refutes the criticism of his method by Vannas (Amer. Jour. Ophth., 1934, v. 17, p. 1078) and defends the procedure as simple, without danger, and, if correctly executed, successful.

C. Zimmermann.

Smaltino, Michele. **Ocular complications in spondylosis rhizomelica.** Boll. d'Ocul., 1934, v. 13, Dec., pp. 1619-1634.

The author gives the history of two patients, aged respectively 35 and 37 years, and affected by spondylosis rhizomelica, both of whom had recurrent attacks of iritis of the left eye, one marked hypopion. The fact that the iritis recurred at the time of attacks of the general disease shows that both lesions arose from the same cause. (Bibliography, 3 figures.)

M. Lombardo.

8. GLAUCOMA AND OCULAR TENSION

Berens, Conrad. **A curved keratome for sclerectomy operations.** Amer. Jour. Ophth., 1935, v. 18, Nov., p. 1053.

Del Barrio, A. **Internal fistulization produced by sclero-ciliary iridencleisis in glaucoma.** Arch. Oft. Hisp. Amer., 1935, v. 35, July, pp. 355-374.

The author's technique resembles the Mauksch cyclodialysis with incarceration of the iris between the sclera

and the detached ciliary body. In the author's technique the scleral incision is made with a keratome, the cyclodialysis effected with a spatula, the iris brought out to the scleral incision with a blunt hook, and a small sphincterectomy is performed, leaving the iris incarcerated between sclera and ciliary body without tendency to return to its normal position. The 39 cases so operated upon were followed for from fifteen days to fifteen months. Good results were obtained in 85 percent of cases of chronic glaucoma, 100 percent of chronic simple glaucoma, 40 percent of secondary glaucoma, and 50 percent of the absolute type. (5 illustrations, bibliography.) R. Castroviejo.

Villani, Giuseppe. **Action of diathermy on ocular tension.** Boll., d'Ocul., 1935, v. 14, Feb., pp. 181-201.

The ocular tension was found lowered after a current of from 300 to 600 ma. applied for twenty minutes to seventy eyes which were either normal or affected by acute localized or diffuse diseases of the cornea, diseases of the anterior uveal tract, or some form of glaucoma. The tension was found lowered soon after the treatment, remained so for several hours, and even reached a lower degree at each application. In two cases of complicated glaucoma the tension remained unchanged. (Bibliography, 5 figures.)
M. Lombardo.

9. CRYSTALLINE LENS

Appleman, L. F. **Intracapsular cataract extraction by the Knapp method as compared with the classic procedure.** A further report. Arch. of Ophth., 1935, v. 14, Aug., pp. 249-252.

This report is based on 300 extractions done in the author's clinic in Wills Hospital. The visual results of 126 intracapsular extractions are summarized and compared with those of 164 extractions with capsulotomy. Vision of 6/12 or better was obtained in about 10 percent more by the intracapsular method. The average hospital stay was three days shorter because recovery was smoother and practically free from reaction. General adoption of this method is urged.
J. Hewitt Judd.

Bakker, C. **The lens in arachnodactyly.** Arch. f. Augenh., 1935, v. 109, Oct., p. 353.

The author studied four congenitally dislocated lenses associated with arachnodactyly. The lenses were thick, but smaller in horizontal and vertical diameters than normal lenses. Their weight was considerably diminished. The lenses appear to have been arrested in development at the seventh month of embryonic life. Since all accompanying changes are of mesodermal origin, the lens changes can be explained as due to insufficient development of the posterior vascular tunic of the lens. The posterior part of the lens fibers, being insufficiently nourished, fails to develop, while the anterior part of the same fibers develops undisturbed. The anterior part of the lens is therefore broader than the posterior, and the fibers bend as they pass backward.
R. Grunfeld.

Bietti, Giambattista. **Vitamin C (ascorbic acid) in ocular fluids and tissues: its relations to biology of the lens.** Boll. d'Ocul., 1935, v. 14, Jan., pp. 3-33.

The vitamin-C content in ocular fluids and tissues of different animals was studied by reduction of dichlorophenolindophenol. The author also investigated the antiscorbutic properties of aqueous and lens and the possibility of increasing the reducing power by intake of vitamin C; the reducing power of aqueous in ocular inflammatory processes and in lesions of ciliary epithelium; and the possibility of etiologic relations between cataract and vitamin-C deficiency and of influencing the course of experimental cataract by supplying ascorbic acid. The writer is not inclined to admit that cataract may result solely from vitamin-C deficiency. (Bibliography.) M. Lombardo.

Di Fede, N. **The medical treatment of cataract.** Rev. Cubano Oto-Neuro-Oft., 1935, v. 4, May-Aug., p. 76.

The author reports nineteen cases treated by iontophoresis, with improvement in visual acuity. With Angelucci and others he believes that iontophoresis marks an advance in the medical treatment of cataract and is not an illusory treatment. M. Davidson.

Euler, H., and Malmberg, M. **New experiments concerning ascorbic acid (vitamin C) in animal lenses.** Arch. f. Augenh., 1935, v. 109, July, p. 225.

The amount of vitamin C present in the lens is determined by the Tillman titration method, subtracting the amount of glutathione. In the cattle eye it amounts to 0.4 mg. (younger animals having a higher value); in rabbits and guinea pigs to 0.16 mg.; in human lens to 0.31 mg.; in the cataractous human lens from zero to 0.05 mg. per gram of lens. Ascorbic acid has the high oxidoreduction potential of —0.20. It is reversibly oxidized and can be reduced with hydrogen sulphide. It increases the effect of kathepsin. In the lens there exists a group of dehydrogenizing agents including glutathione, cozymase, and flavin. The amount of cozymase is 50 co (a cozymase unit which produces 1 c.c. of carbon dioxide per hour by ferment activation) per gram of lens. The flavin is present either free or bound to phosphoric acid, or to a protein as flavin enzyme. Ascorbic acid originates partially from the blood, partially in the lens itself. Hypothetically it may be derived from a hexose or a hexophosphate.

R. Grunfeld.

Goldmann, H., and Buschke, W. **Blood-aqueous barrier and vitamin C.** 2nd communication. Arch. f. Augenh., 1935, v. 109, Oct., p. 314.

The ascorbic-acid content of the aqueous is ten times the amount of vitamin C in the blood. The present experiments serve to prove that the lens does not synthesize ascorbic acid from sugar, but stores the vitamin C of the blood, which the lens reduces to ascorbic acid. Intravenous injection of ascorbic acid into rabbits led to a large increase of ascorbic acid in the aqueous, but only after the ascorbic acid had become gradually oxidized in blood to vitamin C. The same result took place when rabbits were fed with ascorbic acid. When vitamin C in blood decreased, the aqueous lost its ascorbic acid proportionally. These experiments prove a constant relation between vitamin C in the blood and ascorbic acid in the aqueous, and this relation may prove useful as a functional test for lens metabolism. R. Grunfeld.

Grzedzielski, Jerzy. **Histology of roentgen cataract.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 360. (See Section 16, Injuries.)

Gut, Adolf. **Posterior senile subcapsular cataract; its diagnosis and its surgical prognosis.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 77.

From Vogt's clinic 33 cases of posterior subcapsular cataract are described. All had not only posterior subcapsular opacities but also anterior vacuoles, and very delicate opacities directly under the capsule, which could be seen only upon critical focusing. The opacities are not the beginning of senile cataract but the end stage of a senile total sclerosis of the lens. The same changes may also be preceded by coronary cataract, cuneiform cataract, spicule formation, and lamellar splitting. With a large incision these cataracts are easily and successfully removed as the anterior cortex comes out cleanly. The cataract of myotonic dystrophy may be distinguished by the rosettelike character of its posterior opacity and the colors and glistening points in it. The subcapsular cataract here described not infrequently reduces vision so rapidly as to force operation in less than one year.

F. Herbert Haessler.

Müller, H. K. **Biochemical eye-changes produced by naphthalin and the influence of vitamin C upon them.** Arch. f. Augenh., 1935, v. 109, Oct., p. 304.

The ability of the lens to prevent the ascorbic acid of the aqueous from becoming oxidized in vitro was temporarily lost by lenses of rabbits that had been fed with naphthalin. The loss was

in direct relation to the amount of naphthalin fed; such lenses even assisting in the oxidative process. Intravenous injection even of a great amount of ascorbic acid counteracts only slightly the effect of the naphthalin. It is assumed that the deleterious effect of naphthalin depends not on the fact that it oxidizes the ascorbic acid, but that it disturbs the relation of the redox systems to each other. R. Grunfeld.

Mura, F. **Contribution to the etiology of senile cataract.** Boll. d'Ocul., 1935, v. 14, April, pp. 526-548.

From clinical and laboratory researches on 22 patients affected by cataract, the writer concludes that the disease was not in relation to age, which ranged within wide limits; to blood pressure, which varied from 85/45 to 210/90 mm. Hg; to intraocular pressure, which was within normal limits; to the glycemic, the uremic, or calcium-potassium percentage, which did not go above normal limits; or to renal function. The writer is inclined to associate the pathogenesis of senile cataract with dysfunction of the endocrine system, particularly of the thyroid, hypophysis, and suprarenal, in relation to the process of senile involution. (Bibliography.) M. Lombardo.

Pallares Lluesma, J. **Hernia of the iris. Complications of cataract operation in eyes with pterygium.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, June, pp. 326-329.

Cataract extraction was performed on a patient with recurrent pterygium on the nasal side. Three days later a small hernia of the iris was found nasally. The author believes the hernia was produced by imperfect closure of the incision, due to traction by the pterygR. Castroviejo.

Palmieri, Leopoldo. **Experimental researches on the pathogenic mechanism of congenital lens opacities.** Boll. d'Ocul., 1934, v. 13, Dec., pp. 1635-1647.

Examinations made in 53 rabbits born of 23 mothers which while pregnant had been immunized passively with rabbit anti-lens serum obtained from the chicken, and actively with lenticular proteins, indicate that immunologic procedures do not provoke lens changes in the new-born.

M. Lombardo.

Rubino, A. **Cataract and spasmophilia.** Boll. d'Ocul., 1935, v. 14, Jan., pp. 153-171.

Experiments were made to ascertain whether cataract could be produced in rabbits by intoxicating them with a tetanogenic poison such as one of the guanidin group. Neither biomicroscopic examination between the tetanic attacks nor histologic examination of the enucleated eyes revealed any lesions in the crystalline lenses. The author excludes a purely toxic origin of cataract in tetany. In such cases the cataract may result from changes of the ionic-saline electrolytic system of the kind found in tetany from thyroid deficiency. (Bibliography.) M. Lombardo.

Schroeder, Hans. **New speculum and lens forceps for the intracapsular cataract operation.** Arch. of Ophth., 1935, v. 14, Aug., pp. 268.

Solid blades are fitted on a rigid U-shaped piece which is of two sizes, permitting a 25 or a 32 mm. opening. Its construction is well shown in the photographs. The lens forceps is a modification of Terson's, of which each blade is fitted with two long teeth intended to grasp the lens substance instead of the capsule.

J. Hewitt Judd.

Selinger, Elias. **Effect of extract from cataractous human lenses on senile cataract.** Arch. of Ophth., 1935, v. 14, Aug., pp. 244-248.

The previous conflicting reports on the use of lens antigen are reviewed and the author's method of preparation of the extract from senile cataractous lenses is described. Five patients with bilateral incipient progressive senile cataract were selected and given subcutaneous injections twice a week for three months. Two showed initial improvement in vision followed by rapid reduction. Two remained unchanged af-

ter four months and eighteen months respectively, while in the fifth the vision remained improved after fifteen months, although the slitlamp revealed that the cataracts were still progressing. The extract seemed to have no effect on the progress of senile cataract.
J. Hewitt Judd.

Strachov, V. P. **Impressions on intracapsular cataract extraction and some details of its technique.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 768.

The author recounts the development of intracapsular extraction at the end of last century in Russia. In spite of loss of vitreous and iridocyclitis in thirty percent of the cases the Russian ophthalmologists stood by their procedures. The development of such safeguards as effective anesthesia, analgesia, akinesis, retrobulbar injection, and dependable fixation led to entirely different results. The author discusses in detail the significance of the thickness, tenseness, and elasticity of the lens capsule. He does intracapsular extraction with an iridectomy, and does not tumble the lens. In discussing postoperative complications he reports three cases of postoperative hemorrhage into the anterior chamber and vitreous several days after the extraction. The author believes that the hypotony associated with intracapsular extraction is conducive to hemorrhage from the iris and ciliary body.
Ray K. Daily.

Strampelli, Benedetto. **Biomicroscopy and histology of cataract by polarized light.** Boll. d'Ocul., 1934, v. 14, Jan., pp. 34-125.

An extensive report is given of the biomicroscopic findings in nuclear cataract, under polarized light, together with some histologic findings. (47 tables, 225 figures in black or color, bibliography.) M. Lombardo.

10. RETINA AND VITREOUS

Basile, Giambattista. **Effects of roentgen therapy in thrombosis of the central retinal vein.** Boll. d'Ocul., 1935, v. 14, Feb., pp. 236-253.

The writer gives the history and results of treatment with small doses of filtered X rays in twelve patients affected by thrombosis of the central vein or some of its branches. The hemorrhages were absorbed in a relatively short time, with disappearance of stasis. The vision improved in every case, and the treatment did not cause any change in the lens or in other ocular structures. (Bibliography.)
M. Lombardo.

Baurmann, M. **Destructive processes in the vitreous of the human eye and their importance for the formation of retinal tears.** Graefe's Arch., 1935, v. 134, p. 201.

Four normal eyes from patients aged respectively 16, 31, 34, and 55 years showed definite disintegration in the fine structure of the vitreous, resulting in the formation of holes in the vitreous. A firm anatomic union exists between the vitreous and the retina or the epithelial layer of the ciliary body. This anatomic relation, in association with the very considerable tendency of the vitreous to disintegrate, leads to considerable traction at several points in the most anterior part of the retina when the eyeball is moved, and forms a basis for occurrence of some retinal tears. H. D. Lamb.

Bunge, E. **Observations on uniform treatment of retinitis pigmentosa and determination of sexual hormones in the urine.** Zeit. f. Augenh., 1935, v. 87, Aug., p. 26.

In 264 family trees of recessively inherited retinitis pigmentosa collected in the literature Wibaut found that 57.5 percent of the afflicted persons were males. He hypothetically ascribed the relative minority of the females to the action of female hormones and therefore tested the therapeutic use of follicle hormone in the preparation menformon. To each of five patients he gave 500 to 1,000 units of menformon per day by mouth. He got no evidence that menformon was responsible for the slight improvement observed in two of them. The treatment did no harm. He discusses the possible modes

of action of the hormone: vasodilatation and direct action on the nervous tissue. Quantitative estimation of sexual hormones in retinitis pigmentosa showed androchinin to be excreted in normal amounts and thelykin in greatly reduced amounts.

F. Herbert Haessler.

Deutschmann, R. **Again the retinal tears.** Zeit f. Augenh., 1935, v. 87, Oct., p. 203.

Deutschmann records some new observations to reiterate his belief (1) that retinal tears are secondary to detachment and are a compensatory mechanism to relieve tension in stretched retinal tissues; and (2) that retinal detachment can heal without sealing of the hole and often does not heal despite such closure. By his method of repeated puncture 25 to 30 percent of the eyes healed as satisfactorily as the 30 percent that are claimed for other methods now in vogue.

F. Herbert Haessler.

Grolman, G. von. **Epipapillary membrane and persistent hyaloid artery.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 537.

In a boy of seventeen years with hyperphoria, narrow palpebral fissure, and slight enophthalmos, a membrane covered the vessels and the lower half of the disc, and from it a persistent hyaloid artery floated freely into the vitreous. The theory of insufficient involution of the ectodermal sheath and hyaloid artery, to account for the epipapillary membrane, is therefore valid. M. Davidson.

Hesky, Mario. **A case of spontaneous perforation of retina without detachment, in myopia, with a retinal flap protruding in the vitreous.** Boll. d'Ocul., 1935, v. 14, Jan., pp. 126-152.

A man of 38 years showed, even nine years after the first examination, a hole in the retina in the 10.30 o'clock meridian, in an eye myopic 16 D. A retinal flap protruding into the vitreous, and originating from a horseshoe laceration, was adherent by its base to the margin of the hole. The writer is of opinion that this adhesion prevented a flow of vitreous outside the retina and consequent detachment of the retina. (Bibliography.) M. Lombardo.

Jancke, Gerhard. **Cysts and detachment of the retina in a young man.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 145. (Ill.)

The right retina of a man aged 21 years presented two large cysts and a large tear at the ora serrata, probably produced by traction from the cysts. The eye had secondary glaucoma. As the left retina also showed symmetrically situated cysts, the affection was perhaps due to congenital inferiority of the retinal tissue.

C. Zimmermann.

Karasek, Otto. **Angiomatosis retinae.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 163. (Ill.)

The right eye of a man of 27 years, in the second stage of angiomatosis retinae, showed in the upper part of the fundus a triangular tumor protruding 5 D., in which terminated a vein enlarged to four times its normal size. There were capillary venous glomeruli and numerous yellowish-white retinal spots. The retina surrounding the mass was flatly detached. Vision was 6/60. There was an absolute central scotoma for colors, and a pear-shaped scotoma in the inferior temporal quadrant. On account of a slight tendency to fall, and tremor of the protruded tongue and fingers, the possibility of a cerebellar tumor could not be excluded. Heredity was doubtful. C. Zimmermann.

Lambert, R. K. **Studies of the retinal circulation by direct microscopy.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1003-1012.

Lijo Pavia, J. **Scleral transillumination in retinal detachment, for precise localization of tear.** Rev. Oto-Neuro-Oft., 1935, v. 10, Aug., p. 201.

The author quotes his own description of the technique in a previous paper under a different title (see Amer. Jour. Ophth., 1934, v. 17, p. 1085).

Lijo Pavia, J. **A periscope as an aid to diascleral transillumination for retinal localization.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 371. (Ill.)

During operation for a retinal tear 4 mm. lateral from the optic nerve in the horizontal meridian, coincidence of the center of the tear with the illuminated point of Lange's lamp, applied to the sclera, could be directly observed through the cornea.

C. Zimmermann.

Marchesani, O., and Stauder, K. H. **Cerebral symptoms with retinal periphlebitis (angipathia retinae juvenilis).** Arch. f. Augenh., 1935, v. 109, Oct., p. 281.

The authors describe eight such cases. Beside retinal periphlebitis they found symptoms of thromboangiitis obliterans in the extremities, with neurologic symptoms such as abducens, facial, or trigeminal paresis, and paresis of the extremities. The first symptoms are of a purely focal nature. Later, when the vasomotor disturbance spreads, they take on the characteristics of a diffuse brain disease resembling multiple sclerosis. Though the afflictions are not of hemiparetic type they are overwhelmingly one-sided, differing in this respect from multiple sclerosis. The disease affects only youth between the ages of 30 and 35 years.

R. Grunfeld.

Moreu, A. **The temperature dosage in treatment of retinal detachment by electrocoagulation.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Sept., pp. 460-472.

The pyrometric electrode of Coppez is briefly described by the author, who finds it inaccurate and too delicate. A control on the principle of the electric regulator of Regaud will be used by the author, who will report his results.

R. Castroviejo.

Pereira, R. F. **Remarks on the surgical treatment of retinal detachment.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 543.

A case in which application of the electrode was unduly prolonged because of its defectiveness and in which intraocular hemorrhage resulted on the eighth day, was reëxamined six months later. A small area of proliferating retinitis was found at the site of each puncture, and the retina was perfectly reattached, but vision nil. On the basis of two other cases of retinal detachment in which a seeming hole in the macula proved by red-free ophthalmoscopy to be really macular detachment, the writer warns against hasty diagnosis of hole in the macula. Diathermal puncture is the best and an almost harmless treatment.

M. Davidson.

Pereira, R. F. **Retinal detachment and diathermy.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 473.

Pereira suggests that retinal detachment cases operated upon with reattachment but without functional restoration should not be reported as cured; and that a case which relapses should not figure as a cure except when successfully reoperated upon, and then only as one successful case.

M. Davidson.

Puglisi-Duranti, Giovanni. **Lesions from diathermo-coagulation in the vitreous.** Boll. d'Ocul., 1935, v. 14, March, pp. 383-445.

Thirty-four rabbit eyes were used, employing a current of from 250 to 50 ma., and a coagulation time from seven to twelve minutes. The vitreous was reached with an insulated needle through sclera, choroid, and retina. Biomicroscopic examination was made every two or four days, and the eyes were enucleated at different intervals of time for microscopic examination. In every case the retina was found detached, and tears were visible in seven cases. Hemorrhages in retina and vitreous, striations due to coagulation of the vitreous, adhesive chorioretinitis, exudations in the anterior chamber, hyperemia of the uveal tract, and in some cases cataract were also encountered. (Bibliography, 36 figures.)

M. Lombardo.

Raverdino, Emilio. **The treatment of retinal detachment of tuberculous ori-**

gin without tear. Boll. d'Ocul., 1935, v. 14, March, pp. 371-382.

A woman of 39 years with detachment of the lower part of the retina showed a positive Pirquet reaction and marked dullness at the apex of the upper lobe of the right lung. No tear was visible. The writer trephined the sclera and obtained permanent reattachment, verified four years later. The writer believes that trephining is the logical method of treatment in detachment of tuberculous origin, as tuberculous exudates have a tendency to form adhesions between the detached coats while appropriate general treatment takes care of the tuberculous lesion of the choroid. (Bibliography 5 figures.)

M. Lombardo.

Rintelen, F. **The histopathology of the fundus changes in Niemann-Pick's lipoidosis.** (. . . relation between Tay-Sachs idiocy and Niemann-Pick lipoidosis.) Arch. f. Augenh., 1935, v. 109, Oct., p. 332.

The prominent greenish-gray circle around the red fovea centralis in Tay-Sachs amaurotic idocy and in the great majority of cases of Niemann-Pick phosphatid lipoidosis is due to edematous imbibition and breaking up of the inner granular and reticular layers of the retina; and also to lipoid infiltration of the ganglion cells and to increase in glial tissue. The degenerated cells liberate toxic substances producing the edema. The cell decay is a long protracted process, hence the persistence of the edema. In the macular ragion the degenerate cells are most numerous, so that the edema is limited to this area. The author studied one case of Niemann-Pick disease with characteristic macular findings. The lipoid infiltration of the ganglion cells was not so outspoken as it would have been in a similar case of Tay-Sachs idiocy. Atrophy of the optic nerve and of the nerve fibers of the retina was absent.

R. Grunfeld.

Sabbadini, Dario. **Contribution to the surgery of retinal holes at the posterior pole of the eye.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 349. (Ill.)

In a woman of 27 years a submacular hole was cured by diascleral electrocoagulation, without central scotoma. The measuring apparatus, a modification of Lindner's, is described. After a review of the literature, the author affirms the possibility of operating on posterior retinal holes, but this must be done below the hole to secure real agglutination. Canthotomy and resection of the external rectus seem unavoidable.

C. Zimmermann.

Tertsch, Rudolf. **Pendulous tissue strand in the vitreous as congenital anomaly or early (intrauterine?) inflammation.** Zeit. f. Augenh., 1935 v. 87, Oct., p. 199.

The anomaly was observed in a fourteen-year-old boy with very low visual acuity in one eye. A massive strand of white tissue projected into the vitreous and had free pendulous motion. It took origin over the superior temporal retinal vein in an area of striate opacity of the retina which traversed the fundus from the disc through the fovea to the utmost visible limit.

F. Herbert Haessler.

Weekers, L. **Laboratory experiments concerning the surgical treatment of retinal detachment.** Arch. d'Opht., 1935, v. 52, Sept., p. 636.

From experimental evidence the author finds that the episcleral tissue plays a predominant part in the cicatricial process between the retina and the globe. Sclera and choroid on the other hand play no part, or at most a small one. At times the episcleral proliferation is slight, again exuberant, but never absent. External galvanocauterization of the sclera, without perforation, leads to adhesive scars of the choroid, and the same occurs when a caustic substance (tincture of iodine) is injected subconjunctivally. Every extended and diffuse choroidal reaction is bad. Not only must the sclera be perforated, but also the choroid, in order to obtain a satisfactory result. The best choroidal scars are those which result

from mild localized lesions. From these thoughts the author evolved a new technique, consisting of finely pointed galvanocauterization of the sclera as far as the choroid, with multiple punctures. After this is completed the choroid is perforated at each place with the very sharp point of an especially ground Graefe knife. (Illustrations.)

Derrick Vail.

Weskamp, R. L. **Treatment of retinal detachment by diathermocoagulation.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 504.

The author reports on six cases operated on by the Weve method with four cures, one partial reattachment, and one failure complicated by diabetes and hypertension. (Illustrated.)

M. Davidson.

Wüllenweber, G. **What significance have retinal hemorrhages for diagnosis, prognosis, and therapy of general disease.** Zeit. f. Augenh., 1935, v. 87, Oct., p. 175.

The author, an internist, discusses the diagnostic importance of retinal lesions associated with hemorrhage. In infectious diseases retinal hemorrhage occurs and is probably analogous to brain hemorrhage in grippe and in encephalitis. Diagnosis may be difficult; the prognosis is good. Retinal hemorrhage in sepsis may be the one manifestation that the disease is no longer localized but has begun to metastasize. In endocarditis it makes the prognosis much worse. In avitaminosis, thrombocytopenia, and vascular damage, skin hemorrhage occurs in dependent parts; so that the author suggests sleeping with the head high to avoid retinal hemorrhage. Nephritic retinitis is a result of hypertension and not of uremia. The retinitis of pregnancy is a manifestation of arterial spasm. In essential hypertension, retinal hemorrhage is to be evaluated like cerebral hemorrhage.

F. Herbert Haessler.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Colomba, Niccolo. **Behavior of chromatic sense in various affections of the optic nerve.** Boll. d'Ocul., 1935, v. 14, April, pp. 553-594.

The writer tested the chromatic sense in nineteen patients two of whom had tabetic atrophy, six descending atrophy, four postneuritic atrophy, two retrobulbar neuritis, and five papilledema. Central sensibility was first tested, and then peripheral every ten degrees along the two principal meridians. The results for red, green, and blue are given in tabular form. Chromatic sensibility was reduced in all cases. In tabetic and descending atrophy sensibility to green was more reduced. In some cases chromatic sense was not diminished in proportion to central visual acuity. The limits of the field for form and colors were the same in all cases. (Bibliography.)

M. Lombardo.

Fischer, Franz. **Clinical study of optic atrophy in tumors of the hypophysis.** Zeit. f. Augenh., 1935, v. 87, Oct., p. 184.

To assist differentiation from similar forms of optic atrophy, Fischer has studied the records of all the cases observed in his clinic in the last ten years, including 59 of endosellar hypophyseal tumor, almost all operated on by Hirsch according to his own endonasal technique. Early in the disease, the discs may be normal though bitemporal hemianopsia and defective vision may already be present. The commonest papillary finding is temporal pallor. Successful operation does not always stop the progress of the papillary changes, even though vision and field remain stationary or improve. In contrast, the disc of tabetic atrophy is almost never normal when the visual functions have become abnormal. Though the pallor in tabetic atrophy may be temporal in its beginning, it soon becomes total; and from beginning to end the atrophic disc of tabes is strikingly white. In retrobulbar neuritis, a normal papilla early in the disease is common, the temporal pallor that develops remains limited to the temporal half or a sharply circumscribed part of it, and when the nasal half of the disc becomes involved this

is only after long continuance of the disease or repeated recurrence.

F. Herbert Haessler.

Jensen, C. D. F. **Hyaline bodies (drusen).** Arch. of Ophth., 1935, v. 14, Aug., pp. 269-281.

The author reviews the literature and reports a case in which drusen of the nerve head were found in one eye of a girl aged nine years. (Photographs, bibliography.) J. Hewitt Judd.

Joiris, N. P. **Positive and transitory central scotoma (Weekers' sign) in retrobulbar optic neuritis, in the course of acute intoxication by methyl alcohol.** Arch. d'Opht., 1935, v. 52, Aug., p. 578.

Weekers has described a positive transitory central scotoma in retrobulbar optic neuritis due to chronic nicotine-alcohol poisoning (see Amer. Jour. Ophth., 1934, v. 17, p. 1192). This sign is not absolutely pathognomonic of tobacco amblyopia, but is rarely found otherwise. The author reports the case of a man aged 41 years, who while intoxicated drank a glass of methyl alcohol. Twelve days later ocular examination revealed an enormous central scotoma in each eye. When these had cleared, positive transitory central scotomata were demonstrated. The author claims that Weeker's sign can be used to differentiate toxic amblyopia from other forms of acute retrobulbar optic neuritis. (Illustrations, references.) Derrick Vail.

Koyanagi, Y. **The genesis of choked disc in nephritic retinitis.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 182, (Ill.)

Four fatal cases of nephritis with choked disc are described clinically and anatomically. In none was the lamina cribrosa displaced forward. Rather it was displaced backward, even in case two, in which lumbar puncture had revealed increased intracranial pressure. Therefore the author interprets choked disc in nephritic retinitis as a merely intraocular process, an edema from a toxic secretion of the pigment epithelium. There were no inflammatory changes. C. Zimmermann.

Lauber, H. **The relation of general and retinal blood pressure to intraocular tension, and its influence on the optic nerve and retina.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 65.

Method and apparatus for measurement of blood pressure in the retinal vessels—of which Sobanski's modifications made in Lauber's clinic are accounted best—have yielded new facts. The pressure in the retinal arteries has in great degree a regulation of its own. Under fifteen years of age the maximal retinal venous pressure is 28 mm. the minimum, 16 to 22 mm. Between fifteen and forty years of age the maximum and minimum are 34 and 20 mm. respectively; after forty years, 36 and 23 mm. The retinal arterial maximum and minimum under fifteen years of age are 68 and 40 mm.; after fifteen years 80 to 90 and 48 to 56. The very important ratio between the retinal arterial and venous pressure is between 1 to 1.9 and 1 to 3.0. The ratio of minimal retinal arterial to brachial is 1 to 1.4 or 1.5, and the ratio of maximal retinal arterial to brachial is 1 to 1.6. The extremely important capillary pressure can only be estimated by inference, but Sobanski, after considering all available evidence, believes it to vary between 33 and 55 mm. of Hg.

The diastolic venous pressure on the disc is a measure of intracranial pressure. In 98 cases the figure was correct within 4 percent error when the intraspinal pressure was under 250 mm. water and within 2.5 percent when it was greater than 250 mm. water. Choked disc develops when the relationship between the diastolic venous pressure and the retinal arterial pressure becomes abnormally high. Thus choked disc may be absent in increased intracranial pressure when the general blood pressure is high, and intracranial pressure which is only slightly increased may lead to early choked disc and rapid destruction of vision when the general arterial pressure is low. Mechanically, choked disc is explained by the fact that the pressure which is transmitted to the intervaginal space interferes with the outflow from the vena centralis unless the arterial pres-

sure is so high that it can maintain adequate circulation. When intraocular tension is low, choked disc may develop ex vacuo. At the other end of the scale of normal variation are cases of increased intraocular tension without glaucoma. Patients in this category observed by Lauber had a high general arterial pressure.

Systematic study of the blood-pressure relationship in cases of optic atrophy revealed low vascular pressure with normal intraocular tension, and more rapid destruction of visual function usually occurred when intraocular tension was high. An unfavorable influence of antiluetic treatment on tabetic optic atrophy is ascribed by Lauber to reduction in the blood pressure. When blood pressure was carefully controlled during specific treatment, visual function remained stationary or improved. In cases of optic atrophy, satisfactory therapeutic results were obtained by decreasing the intraocular tension, and where necessary the author has resorted to cyclodialysis, with gratifving results. Possibly the beneficial effect of surgical removal of the carotid sympathetic plexus, as described by Magitot, may be ascribed to its effect on pressure relationships. F. Herbert Haessler.

Riedl, F. **Hereditary congenital atrophy of the optic nerve.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 332, (Ill.)

Through three generations congenital atrophy of the optic nerve was presumably inherited, with a typical clinical picture apart from irregular defects of the visual fields. There were no other pathologic symptoms, and roentgenograms of the sella gave no evidence of hypophyseal change.

C. Zimmermann.

Salzmann, Maximilian. **Physiologic excavation and intercalary tissue.** Zeit. f. Augenh., 1935, v. 87, Aug., p. 1.

The details of the center of the disc are rather neglected in most of the commonly used atlases of ophthalmoscopy. Salzmann proposes to remedy this defect and also points out that intercalary tissue is sometimes visible ophthalmoscopically.

Salzmann suggests that the term "vascular portal" be used to denote the place where the central retinal vessels emerge in the depth of the lamina cribrosa. The fibers of the lamina coalesce with the extension of pial fibers and form a definite connective tissue ring which separates the central vessels from the nerve fibers. The intercalary tissue, which consists of a very loose mass of glial fibers, is only visible in a few eyes. When optical conditions are optimal it may be visible as a tiny grey dot in the whiter tissue of the vascular portal. Whether the gray spot in the paler tissue of the portal is indeed the ophthalmoscopic manifestation of intercalary tissue can only be demonstrated by opthalmoscopic and anatomical study of the same eye. Salzmann has had this opportunity once.

F. Herbert Haessler.

Spector, S. A. and Chvorov, V. V. **Ocular changes in Paget's disease.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 790.

After brief survey of the literature three cases are reported. The ocular changes are not characteristic, and the changes in the visual field are dependent upon exostoses and deformities in the orbit of the sella turcica. In optic atrophies of obscure etiology associated with bony deformities the possibility of Paget's disease should be taken into consideration. Ray K. Daily.

Vejdovsky, V. **Optic nerve atrophy following rupture of acute lacrimal abscess into orbit.** Ceskoslovenska Oft.. 1935, v. 2, no. 1, pp. 36-37.

A female aged thirty years had chronic dacryocystitis for three years. The acute abscess of two days' duration, from which pneumococci were isolated, ruptured into the orbit, causing severe cellulitis and abscess. Only after eight weeks were the drainage incisions healed. On entrance to the hospital the optic disc appeared normal, although vision was nil. Later the nerve became completely atrophied.

Georgiana Dvorak Theobald.

Volochov, A., Gerschuni, G., and others. **Ocular chronaxia in diseases of**

the optic nerve and retina. Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 757.

The study was made on two eyes with macular lesions, three with retinitis pigmentosa, two with retrobulbar neuritis, one with retinal detachment, two with optic neuritis, one with choked disc, and two with postoperative anophthalmos. The findings show that the phosphene phenomenon produced by electric stimulation is due to the action of the neuroconducting portion of the visual pathway. The phenomenon was not altered by retinal lesions involving the neuroreceptive fibers; it was present following enucleation of an eye with light perception, and absent after enucleation of an eye with complete optic atrophy. The results are at variance with those reported by Best at the 1932 Leipzig meeting of the German Ophthalmological Society. Best failed to elicit the phosphene phenomenon in operative anophthalmos, because the optic nerve was under the influence of novocaine anesthesia.

Ray K. Daily.

12. VISUAL TRACTS AND CENTERS

Juba, Adolf. **Anatomic investigations in unilateral peripheral blindness and chronic alcoholic retrobulbar neuritis.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 148. (Ill.)

In a man of 34 years, affected by chronic alcoholism, the degeneration of the papillomacular bundle could be traced in the intracranial optic nerve, the chiasm, and the tract. Corresponding to former observations by Rönne and Juba, a localized atrophic dorsocentral area was found in the external corpus geniculatum. This suggests projection of central vision in the external geniculate body. Both optic radiations showed symmetric fatty degeneration.

In a man of 48 years, whose right eyeball had been enucleated, both external geniculate bodies showed alternate atrophy of the lamellae so distributed that at the side with the optic atrophy the central, and contralaterally the peripheral, large and medium-large-celled strata were atrophic. As the pregeniculate gray matter showed no change, the assumption of Hecht that this nucleus does not belong to the primary optic centers proper is confirmed. The visual cortex was perfectly intact.

C. Zimmermann.

Molina, T. **Hemianopsia with transitory aphasia.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 552.

The author discusses the probable pathology and localization of a cerebral lesion initiated by xanthopsia in an alcoholic and luetic with right hemiparesis and Wernicke's sensory aphasia. He recovered first from verbal deafness, then from alexia through the stage of dyslexia, and also from apraxia. But he retained right homonymous hemianopsia and dyschromatopsia. The author argues for involvement of the posterior cerebral artery, or the deep parietal syndrome of Foix, rather than for an angular-gyrus syndrome.

M. Davidson.

Uriarte, A. B. **Pupillary movements. A new theory on the pathogenesis of the Argyll Robertson sign.** Ann. d'Ocul., 1935, v. 172, Aug., pp. 672-687.

According to Uriarte's theory the normal photomotor pupillary reaction consists of dilatation in darkness rather than active contraction to light, absence of light being regarded as the stimulus. Thus loss of the photomotor reflex would show as absence of dilatation in the dark and would indicate a lesion involving the pupillary dilator rather than the sphincter. This explains the miosis and the preservation of contraction to convergence accompanying loss of the photomotor reflex. The theory is in accordance with the phylogenetic development of iris movements.

John C. Long.

Volochov, A., Gerschuni, G., and others. **Ocular chronaxia in diseases of the optic nerve and retina.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 757. (See Section 11, Optic nerve and toxic amblyopias.)

13. EYEBALL AND ORBIT

Adamantiadis, B. **Neuroma of the orbit.** Arch. d'Opht., 1935, v. 52, Aug., p. 582.

In 1929 a girl aged twelve years had hydatid cysts of the orbit, which ruptured through into the nose. (See Amer. Jour. Ophth., 1929, v. 12, p. 942.) Five years later she presented herself with a paralytic divergent strabismus. On palpation of the orbit a localized soft tender swelling was discovered just below the superior margin, and at exploration a tumor the size of a hazel nut was found adherent to the orbital margin. Histologically it was a true neuroma. The author explains it as arising from the cut end of a nerve, severed at the time of the first exploratory operation in 1929. (Illustrations.)

Derrick Vail.

Csapody, Istvan. **A new plastic operation for lining the orbital cavity with a split flap.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 114.

To make a lining for the orbit, skin from a hairless portion of the arm is cut about a template; folded about a special piece of apparatus which resembles a lid retractor with a hemispherical capsule at the end of each arm; inserted into the orbit, from which cicatricial tissue, conjunctiva, and tarsus have been dissected; and sewed into place. With a Graefe knife the central horizontal strip is perforated by three rows of short horizontal incisions. This is the essential part of the operation. The sieve that is formed facilitates drainage, and it divides the flap into two parts so that when shrinkage takes place the flap has two centers of shrinkage, each of which coincides with a point of anchorage near the upper and lower orbital margin. F. Herbert Haessler.

Deggeller, Z. B. **The correlation between syphilitic processes in the orbit and at the base of the brain.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 796.

This is a tabulated report of eight cases with a symptom complex of various combinations of unilateral paralyses of the ocular nerves and trigeminal neuralgias. The clinical picture may culminate in complete ophthalmoplegia, caused by a luetic process in the roof of the orbit, or at the base of the brain close to the orbital fissure. The process frequently advances from behind forward, that is from the base of the brain in the middle cranial fossa in the direction of the orbital fissure. The appearance of exophthalmos signifies orbital involvement. Ray K. Daily.

Gimenez Ruiz, R. **Fibrohemangioma of the orbit.** Arch. de Oft. Hisp.-Amer. 1935, v. 35, Sept., pp. 491-493.

Exophthalmos developed gradually during eight years, with gradual loss of vision, and final blindness. Exenteration of the orbit was performed and microscopic examination showed the tumor behind the eye to be a fibrohemangioma. (2 illustrations, bibliography.)

R. Castroviejo.

Havel, Jar. **Bone formation in an atrophied globe.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 51-53.

The left eye of a 71-year-old woman, blind and atrophied after perforation by a stick at the age of five years, became painful and irritated. Equatorial section showed ossification of almost the entire uveal tract.

Georgiana Dvorak Theobald.

Kalt, Marcel. **Bilateral orbital tumor with double exophthalmos, cured by mercurial treatment.** Arch. d'Opht., 1935, v. 52, Sept., p. 655.

Chronic inflammatory orbital tumors are relatively common, but it is rare that a bilateral and symmetrical case is observed. The author reports the case of a 35-year-old workman who complained of double exophthalmos of two months' duration, and bilateral corneal ulceration. Six months earlier he had noticed in the upper outer region of the left orbit a small indolent tumor which grew rapidly. A few weeks later the same event occurred in the right orbit. There was no associated pain. Examination showed marked bilateral proptosis and immovable globes. Both corneas were slightly ulcerated. All laboratory findings were negative. Biopsy, on the left side, showed a hard white tumor which did not bleed on sectioning. Histologically the tumor consisted of dense connective tissue, inflammatory islands, and vessels affected with endoperivasculitis. At the end of two months of treatment with intravenous mercury,

the tumor and exophthalmos disappeared from the right orbit, but the mass on the left side remained unchanged. The author believes this to be a case of syphilitic osteoperiostitis with sclerogummatous invasion of the orbit. (Illustrations, bibliography.)

Derrick Vail.

Patriarca, A. P. **Brown-Séquard's ocular syndrome caused by acute mastoiditis.** Riv. Oto-Neuro-Oft., 1935, v. 12, March-April, pp. 284-287.

A man who had been affected for about a month by a right mastoiditis with profuse otorrhea and perforation of the drum showed the right lid aperture larger than the left, and mydriasis and exophthalmos of the same side. Nine days after mastoidectomy the ocular syndrome disappeared. To explain the symptomatic connection between the two affected organs the author assumes that the inflammatory stimulus acted on the pericarotid sympathetic through the thin bony wall of the carotid canal. M. Lombardo.

Petri, M. de. **Intermittent and pulsating exophthalmos and their therapy.** Riv. Oto-Neuro-Oft., 1935, v. 12, March-April, pp. 306-338.

The author reports three cases of exophthalmos of vascular origin following head trauma. The first, involving the left eye of a man of 48 years, was intermittent, manifesting itself in certain positions of the body, and was apparently due to orbital varices. The other two, involving respectively the left eye of a woman of 52 and the right eye of a man of thirty years, were pulsating, afebrile, and painless, and were accompanied by a murmur synchronous with cardiac movements. The author discusses pathogenesis, symptomatology, and treatment. (Bibliography, 10 figures.) M. Lombardo.

Saralegui, A. F. **Pulsating exophthalmos.** La Semana Med., 1935, v. 42, June 27, pp. 1841-46.

A shot from a hunting rifle, accidentally fired, entered at the nasolateral fold and lodged, as subsequently shown by X ray, in the region of the sphenoidal sinus and the cavernous sinus. A large bruit was noticed by the patient immediately after the accident. After failure of prolonged digital compression of the carotid vessels, the common carotid was tied, and at the same sitting the outer wall of the orbit was removed and first the superior branch of the ophthalmic vein and then the ophthalmic vein itself, which was as large as a little finger, were ligated. Upon ligation of the ophthalmic vein the patient exclaimed: "I no longer hear the noise." Exophthalmos persisted, but vision, which had previously been counting fingers at 50 cm., gradually rose to normal. (11 illustrations.)

W. H. Crisp.

Wheeler, J. M. **Surgical correction of large coloboma of eyelid.** Trans. Western Ophth. Soc., 1st annual meeting, 1934, p. 75.

The author describes a method of closing defects in the lids by the use of a large skin flap from the temporal region. The flap is freed along its upper and lower edges and from the subcutaneous tissue and is drawn over the eyeball till the suitably prepared edges of the coloboma are brought into contact. The whole flap is then sutured in place with silk. The epithelial covering for the under side is obtained from the bulbar conjunctiva, which ultimately stretches and leaves no serious shortage of epithelium. The operation is completed by transplanting part of the cilia from the temporal part of the lower (or upper as the case may be) lid, to fill in the defect which is left in the lid margin when the flap is drawn to the nasal side. George N. Hosford.

14. EYELIDS AND LACRIMAL APPARATUS

Anelli, Dante. **The palpebral elastic fibers in the animal series.** Boll. d'Ocul., 1935, v. 14, Feb., pp. 202-224.

Examination of the lids of forty animals of different species showed the presence of elastic fibers in all. These usually form plexuses disposed around the openings of sebaceous glands and piliferous bulbs, or among the lobes of meibomian glands, or parallel with the

conjunctiva and the skin. In some animals they have a longitudinal direction on the anterior surface of the tarsus and a transverse on the conjunctival side. (Bibliography, 5 figures.)
M. Lombardo.

Busacca, A., and Maia, J. **Chronic edema of the lids due to leishmania.** Folia Ophth. Orientalia, 1934, v. 1, Sept.-Dec., pp. 372-382.

The two cases reported arose in connection with leishmaniosis of the skin of the nose. The lid condition probably had a mechanical basis in the looseness of the subcutaneous tissue of the lid, with its proximity to the firmly attached skin of the nose. In one case, histologic examination showed signs of chronic inflammation with increase in connective tissue. Similar cases are cited from the literature. (References, 6 illustrations.) W. H. Crisp.

Horner, W. D. **A special clamp for holding lid sutures in lid operations.** Amer. Jour. Ophth., 1935, v. 18, Oct., pp. 957-958.

Imre, J. **Operation of senile ectropion.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 303. (Ill.)

This is a modification of the Kuhnt-Szymanowski method. By a skin incision 3 mm. below the lid margin, parallel and equal to the intermarginal section, and a vertical section at the temporal end joining both, a strip of skin is formed. After cutting out a triangle of conjunctiva and tarsus according to Kuhnt, a similar triangle of the skin below is removed. After suturing the margins of each triangle a superflous strip remains, which is abscinded, its temporal wound edges being carefully united. The sutures are removed after six days. C. Zimmermann.

Ludwig, Alfred. **Milker's nodule upon the upper eyelid.** Arch. f. Angenh., 1935, v. 109, Oct., p. 346.

The concurrence of a peculiar granulation at the lid margin of a milker, differing from all known lid affections, and of a cow-pox-infection nodule on his hand, suggested the same etiology for both. The clinical course and the histological examination justified this assumption. Inclusion bodies could not be detected and inoculation experiments with the material from either source were negative. Vaccination of the patient at the time when the nodule was already healed was followed by a prompter reaction. R. Grunfeld.

McKee, S. H. **A study of the pneumococcus group from the inflamed conjunctiva and lacrimal sac.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1021-1029.

Marquez. **Value of conservative treatment of affections of lacrimal passages.** Arch. de Oft. Hisp.-Amer., 1935, vol. 35, Sept., pp. 455-459.

The author comments favorably on the article of Sáenz Alonzo (see below). Only when simple measures such as syringing and probing fail ought we to resort to dacryocystorhinostomy or extirpation of the sac. R. Castroviejo.

Miterstein, Bathia. **Leishmaniosis of the lid.** Folia Ophth. Orientalia, 1934, v. 1, Sept.-Dec., pp. 383-390.

Six cases of active ulceration and three cicatrized cases are reported, with discussion of the clinical picture, differential diagnosis histology, and complications. Secondary infection is sometimes followed by ectropion. The infection is transmitted by the sandfly, Phlebotomus papatasii. The condition, which is commonly known as "oriental sore" and locally as "Jericho sore," has become more and more frequent in Palestine in recent years. The treatment consists of injections of neosalvarsan or antimonial preparations. (References, 7 illustrations.) W. H. Crisp.

Perez Bufill. **Dacryocystitis of the new-born.** Arch. de Oft. Hisp.-Amer., 1935, vol. 35, July, pp. 345-355.

After a few considerations on anatomy, embryology, and pathology, the author reports twenty cases of dacryocystitis in infants from eight days to thirteen months old. The author regards probing as the treatment of choice. R. Castroviejo.

Riedl, Franz. **Triple lower lacrimal punctum.** Zeit. f. Augenh., 1935, v. 87, Oct., p. 209.

The author describes a lower right lid with three lacrimal puncta. He could find in the literature only three other cases with more than two puncta in the lower lid. The anomaly is commoner in the upper lid. F. Herbert Haessler.

Rollin, J. L. **The direction of the lid slit in congenital lues.** Zeit. f. Augenh., 1935 v. 87, Sept., p. 104.

The author observed that the lid slit slanted down and out in a large number of patients with congenital lues and in some without the disease. To demonstrate this, he has selected thirty representative photographs from his larger collection. F. Herbert Haessler.

Sabata, J. **Unusual course of a supernumerary lacrimal duct.** Ceskoslovenska. Oft., 1935, v. 2, no. 1, p. 37-39.

The thirty-year-old patient had constant epiphora and chronic conjunctivitis on the right side. Immediately above the internal canthal ligament was the opening of a supernumerary duct which led into the sac. After the removal of this duct the lacrimation ceased, and the conjunctival inflammation recovered spontaneously.

Georgiana Dvorak Theobald.

Sáenz-Alonzo, R. **Stricturotomy and probes of great caliber in treatment of the lacrimal passages.** Arch. de Oft. Hisp.- Amer., 1935, v. 35, Sept., pp. 449-455.

An experience of six years has convinced the author that this treatment will in many cases give satisfactory results without resort to more complicated operations such as dacryocystorhinostomy. R. Castroviejo.

Soria, M. **Crystals of cholesterin in the lacrimal sac.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Aug., pp. 435-438.

For chronic dacryocystitis of long standing, dacryocystectomy was performed, and microscopic study of the contents of the sac revealed the presence of a considerable number of small cholesterin crystals. R. Castroviejo.

Tichomirov, P. E. **The use of strong solutions of silver nitrate in epiphora, according to the method of Vengrschenovskii.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 859.

Of six cases treated by the author according to Vengrschenovskii's technique (see below) three developed phlegmonous dacryocystitis. This demonstrates that the method is not free of danger and should be used with great caution. Ray K. Daily.

Vejdovsky, V. **Optic nerve atrophy following rupture of acute lacrimal abscess into orbit.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 36-37. (See Section 11, Optic nerve and toxic amblyopias.)

Vengrschenovskii, G. S. **The treatment of epiphora with a strong solution of silver nitrate.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 850.

After detailed description of variations in the anatomic structure of the lacrimal sac the author describes his method of treatment of epiphora, which consists of instillation of a 5 to 10 percent silver nitrate solution, immediately neutralized with physiologic salt solution. The effect is of vasoconstriction, diminution in secretion and transudation, and moderate leucocytosis. Of 38 cases thus treated 82 percent made complete recovery. Ray K. Daily.

Von der Heydt, Robert. **Ocular chalcosis.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1045-1047.

15. TUMORS

Borsellino, Gaspare. **A case of pure subconjunctival lipoma.** Boll. d'Ocul., 1933, v. 14, April, pp. 517-525.

A girl of fifteen years showed a tumorlike formation at the temporal side of the right eyeball. The eye was very small for her years but had begun to grow rapidly at puberty. The growth was of the size of an almond, of pale pinkish color, was easily movable over the sclera, and had no adhesions with the conjunctiva. Histologic examination showed it to be a lipoma containing no ectodermal structures. The writer thinks that lipoma represents a well de-

fined oncologic entity to be distinguished from corneo-conjunctival teratoma. (Bibliography, 2 figures.)

M. Lombardo.

Caocci, G. **Cylindromatous basal-cell epithelioma of the lower lid.** Ann. di Ottal., 1935, v. 63, July, p. 519.

The author describes a large nodule with the covering skin practically unbroken, which on pathologic examination proved to be an epithelioma of the basal-cell variety. A few acini and numerous cystic cavities of varying size gave the tumor the appearance of a cyclindroma. The author notes some rather uncommon features of the growth and gives certain hypotheses as to its origin. (Two plates, bibliography.)

Park Lewis.

Chechik-Kynina, E. A., and Levkoeva, E. F. **Epibulbar neoplasms at the limbus.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 776.

Detailed case histories of twelve limbus neoplasms seen between 1926 and 1933 include five nevi, three of which assumed malignant characteristics. Careful histologic study of these growths supports a belief in their ectodermal origin. Of four tumors of epithelial origin, two were papillomas and two carcinomas. Histologic study demonstrated the bizarre morphology and the absence of typical papillomatous structure at the limbus. Of three epibulbar sarcomas, one was a leucosarcoma and two were pigmented. The fact that of twelve tumors only four were benign calls for close clinical observation of such cases. (Illustrations.)

Ray K. Daily.

Cori, Renzo de'. **"Carcinomatous epithelioma" of the cornea.** Boll. d'Ocul., 1935, v. 14, March, pp. 305-316.

A man of sixty years with binocular trachoma showed a total leucoma of the left cornea in the middle of which was visible a rapidly growing tissue whose base appeared under the slitlamp to be poorly delimited from the surrounding tissue. The microscopic appearance of the tumor is described. (Bibliography, 6 figures.)

M. Lombardo.

Cushman, Beulah. **Lipoma of the orbit following implantation of fat after enucleation.** Arch. of Ophth., 1935, v. 14, Aug., pp. 265-268.

The right orbit of a girl aged 15 years was filled by a mass which on removal proved to be a lipoma. This resulted from overgrowth of a flat implant in Tenon's capsule at the time of enucleation twelve years before. (Photographs.)

J. Hewitt Judd.

Derer, J., and Friedman, I. **Chloroma of the orbit.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 20-28.

A six-year-old boy, obviously anemic, had bilateral exophthalmos, which had become noticeable three months previously. The lids were edematous and large tumorlike masses protruded from beneath the lids. Both temples were diffusely infiltrated, the right eye had a corneal ulcer, and both fundi showed venous stasis. Liver and spleen and all palpable lymphatic glands were enlarged. X ray showed tumor in the mediastinum. The blood picture was that of myeloid leukemia. Post mortem the orbital tumor was green and there were similar greenish changes in liver, spleen, kidney, dura mater, stomach, and bone marrow. Histologically the orbital tumor was a chloromyeloma, but in some regions it had the structure of a sarcoma.

From the histologic picture, and because the tumor in the spinal cord destroyed the surrounding bone and grew like a malignant tumor, the author agrees with Sternberg and Marzius that chloroma is a real tumor, and the leukemia only a secondary factor resulting from disturbance of the blood-forming organs. He would call the tumor "chloromyelosarcoma."

Georgiana Dvorak Theobald.

Fernandez Balbuena, F. **Nevocarcinoma of the lower lid.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, July, pp. 375-377.

A tumor of the lower lid in a man of fifty years was diagnosed clinically as a nevocarcinoma. It was successfully treated by electrocoagulation, with a

good cosmetic result at the end of one year. (3 photographs.)

R. Castroviejo.

Fewell, A. G., and Fry, W. E. **Bilateral retinal glioma treated by radiation.** Arch. of Ophth., 1935, v. 14, Aug., pp. 190-196.

In a boy aged 21 months the first eye was enucleated and the second eye containing three tumor-masses was irradiated for a period of a year. There was marked reduction in size after the first two irradiations. Eight months later the tumors began to increase and after another four months, when the eye was enucleated, the vitreous cavity was nearly filled with the tumor. There had been no recurrence four months later. In the second eye the lens remained clear in spite of heavy radiation. But degenerative changes in the tumor cells were thought to be due to the therapy. (Photomicrographs.)

J. Hewitt Judd.

Focosi, Marcello. **Contribution to the study of endotheliomata of the bulbar conjunctiva.** Boll. d'Ocul., 1935, v. 14, April, pp. 479-490.

A woman of 68 years showed several small soft elevated oval pinkish tumors surrounding the lower limbs from the 3 to the 9-o'clock meridian. The tumors were covered by numerous veins, some of them ectatic. The tumors were removed and the conjunctiva around them cauterized. No relapse was noted when the patient was examined a year later. Histologically the tissue was endothelioma of the lymph-gland type. (Bibliography, 4 figures.)

M. Lombardo.

Halbertsma, K. T. A. **Familial neurofibromatosis (Recklinghausen).** Graefe's Arch., 1935, v. 134, p. 167.

A family followed through three generations includes altogether 22 individuals. To the first generation belong 7 persons (4 men and 3 women), among whom 3 are affected with Recklinghausen's disease. The second generation includes 8 individuals (4 men and 4 women), among whom 1 woman is affected. The third generation is composed of 5 persons (3 men and 2 women), none of whom show Recklinghausen's disease. In three of the four affected individuals (one was never examined with the ophthalmoscope), tumor masses were observed in the retina. The author concludes that an irregular dominant type of inheritance is present here.

H. D. Lamb.

Irvine, A. R. **Case of retinoblastoma.** Trans. Western Ophth. Soc., 1st annual meeting, 1934, p. 53. (See Amer. Jour. Ophth., 1935, v. 18, Nov., p. 1077.)

Kiehle, F. A. **Tumors of the optic nerve.** Trans. Western Ophth. Soc., 1st annual meeting, 1934, p. 102.

The author reports the clinical and pathological findings in a case of glioma of the optic nerve in an eleven-year-old girl. Histopathologic pictures of the tumor sections as stained by various methods are given.

George N. Hosford.

Köppl, A. **Multiple carcinomatous metastases in the eye.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 310. (Ill.)

A woman of 37 years showed in iris and choroid of each eye metastases from a bronchial carcinoma. She died after five weeks. The affection of the choroid presented the picture of acute choroiditis. Of especial interest were the good vision of the left eye (6/36) in spite of considerable infiltration with tumor at the posterior pole and the macular region, and the absolute hypermetropia not neutralized by accommodative effort. The author assumes that in spite of the normal relatively firm connection of the choroid with the sclera at the posterior pole certain shiftings of these tunics play a part in accommodation, and that in tumor infiltration the choroid not only grows thicker but also rigid. The point is submitted for consideration by proponents of new theories of accommodation.

C. Zimmermann.

Leinfelder, P. J. **Ocular complications in neuroblastoma.** Amer. Jour. Ophth., 1935, v. 18, Oct., pp. 938-943.

Leinfelder, P. J., and O'Brien, C. S. **Lymphoma of the eye and adnexa.** Arch. of Ophth., 1935, v. 14, Aug., pp. 183-189.

The authors review the literature and report the ocular changes observed in one case of the sclerosing type (Hodgkin's disease), three cases of the endothelial type (lymphoendothelioma), four cases of the lymphoblastic type (lymphosarcoma), and five cases of the lymphocytic type (lymphatic leukemia). Beside the retinitis of lymphatic leukemia, the principal ocular changes found were infiltration and nodular thickening of the lids (nine cases), pseudoptosis (eight), exophthalmos (six), conjunctival lymphoma (five), and bilateral enlargement of the lacrimal glands (two). Treatment is of no avail, but roentgen therapy may give temporary relief. (3 photographs.)

J. Hewitt Judd.

Levine, Joseph. **Primary melanosarcoma of the optic disc.** Arch. of Ophth., 1935, v. 14, Aug., pp. 229-238.

In the right eye of a man aged 53 years, the superior temporal portion of the disc presented a bluish elevation of 3 D. The eye was enucleated for tumor of the disc, and examination indicated that the tumor had originated in front of the lamina cribrosa, pushing the papilla forward and nasally. The lamina was pushed backward and finally pierced in one area by the tumor, which extended to the cut end of the nerve. Because exenteration was refused the orbit was irradiated. The patient was in good health when last heard from three months later. The author believes the tumor originated in a melanoma, since the pigment was out of proportion to the cellular content, and because in spite of poor vascularity no area of degeneration was found. He reviews the literature regarding frequency and the relation of melanoma of the disc to melanosarcoma. (Photomicrographs.)

J. Hewitt Judd.

Lijo Pavia, J. **Early diagnosis of incipient sarcoma of the choroid. Enucleation of an eye with normal vision.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 377; also Rev. Oto-Neuro-Oft., 1935, v. 10, Sept., p. 229.

For confirmation of his diagnosis of incipient sarcoma of the choroid Lijo Pavia employed three means which he considers absolutely satisfactory: examination with the stereoscopic ophthalmoscope, examination of the visual field every week, and examination with Lange's contact lamp with consideration of the subjective scotoma. The case reported was in a female of 27 years. The tumor was near the optic nerve, and the diagnosis was confirmed after enucleation. The patient was well after two and a half years. (Photomicrographs and fundus photographs.)

C. Zimmermann.
M. Davidson.

Mier, L., and Rivas Cherif, M. de. **A case of melanoepithelioma of the orbit.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, June, pp. 294-316.

The authors discuss in detail the histogenesis of melanotic tumors, as well as the symptomatology of intraocular tumors. A melanotic tumor of the choroid developed two years after a trauma had been inflicted on the eye. After the injury, no fundus reflex could be detected with the ophthalmoscope, but this fact was attributed by the authors to a vitreous hemorrhage. Two months later, a flat detachment of the retina could be detected, accompanied by moderate hypertension, and two years afterward a tumor had developed at the site of the retinal detachment. Enucleation was performed and microscopic examination revealed a melanoepithelioma of the orbit. (8 illustrations, bibliography.)

R. Castroviejo.

Stallard, H. B. **A case of endothelioma of the optic nerve sheaths.** Brit. Jour. Ophth., 1935, v. 19, Oct., p. 576.

The literature of this relatively rare neoplasm is discussed, together with reported cases. Most are benign or mildly malignant, the destructive effects being due to pressure and extension. In the author's patient, aged thirty years, misty vision had been present during the preceding five weeks. The nasal side of the disc and the adjacent retina

were edematous. About sixteen months later there was slight ciliary injection, and the pupil was dilated. The lower half of the retina was detached, there were retinal hemorrhages, and the intraocular pressure was increased. After enucleation, the nerve near the eyeball, with its sheath, was found to be 7 mm. in diameter. The neoplasm, which was pear-shaped, had a yellowish granular appearance. It probably arose from the arachnoid. It was composed of oval endothelial cells, for the most part irregularly arranged, but partly grouped around blood vessels. (Three photomicrographs.) D. F. Harbridge.

Terry, T. L., and Johns, J. P. **Uveal sarcoma—malignant melanoma.** Amer. Jour. Ophth., 1935, v. 18, Oct., pp. 903-913.

Urrets Zavalia, A., and Obregon Oliva, R. **A case of primary carcinoma of the lacrimal sac.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 521.

The writers estimate that not more than fifty cases have thus far been published in the literature, so that the condition is not common. The case reported was in a male of 47 years with a history of three years of epiphora, without pain or secretion and with permeable lacrimal passages but with swelling of the preauricular lymph gland. Biopsy established the diagnosis of basal-cell carcinoma. Extirpation of the tumor was followed by recurrence seven months later in the lower lid. This was extirpated and radium applied. The writers refer to a previous case with recurrence after extirpation. Thus extirpation without X ray or preferably radium therapy is inadequate. (Photomicrographs.) M. Davidson.

Vito, Pietro. **A case of lymphangioendothelioma of the lid.** Boll. d'Ocul., 1935, v. 14, Feb., pp. 282-287.

A girl of six months had shown since birth a tumorlike formation in the middle third of the right upper lid. Of the size of a pea, adherent to the underlying tissues, and covered by movable skin, it was easily dissected from the skin and tarsus. Histologically it had a lobular appearance and was classified as a benign blastoma. Eighteen months after removal no local or distant relapse was noticed. (Bibliography, 3 figures.) M. Lombardo.

Wostry, Milos. **X-ray therapy of orbital tumors.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 29-35.

During a five-year period (1929-1933) at the Brno eye clinic, X-ray therapy was used in 15 cases of orbital tumor, in four after surgical removal. Of the eleven cases in which X-ray therapy alone was used, one had no recurrence during the five-year period, in two others there has been no recurrence for two and three years respectively, and four were treated during 1933. Four patients died either from recurrence or metastasis.

Of the four cases treated after surgical interference, two died and one had recurrence after four years. In general one can place X-ray therapy on the same level with surgery, but in some cases it may be given preference.

Georgiana Dvorak Theobald.

16. INJURIES

Almeida, A. de. **Hematoma of the sheath of the optic nerve.** Arquivos do Instituto Penido Burnier, 1934, v. 3, Dec., pp. 170-173.

The roof of the orbit was fractured by a gunshot. There was a hemorrhagic exudate into the vitreous, and a hemorrhagic streak at the border of the optic disc. The foreign body was extracted by means of the Krönlein operation. Paralysis of the superior, inferior, and external recti gradually disappeared, and the intraocular hemorrhage was absorbed, but the vision of the affected eye was permanently lost. (5 illustrations.) W. H. Crisp.

Bender, A. **Pantocaine and its noxiousness.** Kin. M. f. Augenh., 1935, v. 95, Aug., p. 251.

A patient used for weeks a ten-percent solution of pantocaine erroneously prepared instead of the prescribed one-percent solution. After four weeks she

had intense pain with sloughing of the gray and swollen epithelium of the cornea. Recovery was slow but complete.
C. Zimmermann.

Block, H. M. **Chemical conjunctivitis following eyelash dyeing.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1052-1053.

Borsellino, Gaspare. **Cataract from shock of industrial electric current.** Boll. d'Ocul., 1935, v. 14, March, pp. 446-457.

A boy of twelve years sustained an electric shock which was followed by opacification of the right lens seven months later and of the left lens a year later. The biomicroscope showed in the right lens a prevalence of subcapsular vacuoles, while radial opacities prevailed in the left lens. The writer emphasizes the importance of the biomicroscopic aspect of such a cataract from the medicolegal standpoint. (Bibliography, 4 figures.) M. Lombardo.

Cavallacci, G. **Concerning the behavior of ascorbic acid (vitamin C) in the eyes of rabbits irradiated with ultraviolet rays.** Arch. di Ottal., 1935, v. 42, May-June, p. 149.

After repeated irradiation of rabbit eyes with ultraviolet rays, a reduction of ascorbic acid was found in retina, lens, and the ocular humors. The author attributes this to intense irritation and congestion in the anterior segment of the globe due to the ultraviolet rays.
Herman D. Scarney.

Chajutin, S. M. **Vocational ocular injuries in workers subjected to high temperatures.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 862.

From detailed study of 139 workers in a metallurgical industry, the author found such workers prone to lowering of adaptation and to lenticular opacities. The protective measures recommended include spectacles, wet curtains in front of boilers, nets to permit observation of boilers but intercepting a part of the heat rays, and spaces apart where the worker may spend time not necessarily spent immediately before the furnace.
Ray K. Daily.

Donovan, J. A. **Double traumatic cataract operation.** Trans. Western Ophth. Soc., 1st annual meeting, 1934, p. 101.

The author reports the case of an eight-year-old boy with bilateral traumatic cataract from a dynamite explosion. He advises delay in removing foreign bodies from within the eye until the cornea clears up so that underlying structures can be seen. Both lenses were successfully extracted and the patient has excellent vision after 22 years.
George N. Hosford.

Fiore, Tito. **Researches on the chemistry of argyrosis.** Boll. d'Ocul., 1935, v. 14, March, pp. 360-370.

Discoloration of the conjunctiva of enucleated eyes which had been kept in a solution of silver nitrate was obtained by the action of a solution of potassium ferrocyanide. The same effect was obtained in the conjunctiva of rabbits which had become argyrotic after instillation of silver nitrate or subconjunctival injection of argyrol, and also in a piece of argyrotic conjunctiva taken from a patient affected by trachoma. Dark-red and black granules seen under the microscope in reticular tissue of conjunctiva previously impregnated with silver nitrate underwent the same change. The writer concludes that argyrosis is due to a deposit of metallic silver in the conjunctiva. Different therapeutic attempts are reported, none of which solved the problem of curing argyrosis. (Bibliography.)
M. Lombardo.

Gimenez Ruiz, R. **Electric cataract.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Sept., pp. 488-499.

Partial anterior capsular cataract developed three months after an electric shock. (1 illustration, bibliography.)
R. Castroviejo.

Grzedzielski, Jerzy. **Histology of roentgen cataract.** Klin. M. f. Augenh., 1935, v. 95, Sept., p. 360. (Ill.)

A man aged 31 years received in 1930 three weekly roentgen radiations for trichophysis barbae. Resulting inflammation of the eyes lasted two weeks. After three years he noticed impairment

of sight. Each lens showed at the posterior pole ring-shaped opacities from which processes radiated to the periphery. After intracapsular extraction the lenses presented proliferation of the epithelium, the cortex and nucleus being almost intact. C. Zimmermann.

Malbran, J. **Bilateral visual involvement from trauma to forehead.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 479.

A laceration of the right forehead was sustained in an automobile accident. The patient was unconscious five days and showed bloody spinal fluid. Right optic atrophy appeared on the twentieth day after the accident, and complete blindness of this eye developed rapidly. No disturbance was realized in the left eye until the patient's fields were taken by Malbran two months after the accident. Although central vision was 20/20, study of the fields disclosed complete loss of the lower nasal field up to the macula in the 2/2000 and 1/2000 isopters, contraction of the lower nasal field, and a lower nasal juxtamacular scotoma in the 3/250 isopter. X ray of the skull including the optic foramina was negative. In this case, and in general, the commonly accepted explanation of optic nerve involvement by fracture or callus of the foramen or hemorrhage into the sheath of the optic nerve seems to Malbran improbable. Fractures with displacement of consequence are rarely demonstrable. Because of the naturally meager callus in this region, and because of the rapid onset of optic nerve involvement, callus formation is also an inadequate explanation. Observation, at autopsies of 42 cases of skull injury with marked displacement of the whole brain mass, leads Malbran to suggest in his case a laceration of both optic nerves, one complete, the other partial, from backward displacement of the entire brain. M. Davidson.

Nizetic, Zdravko. **The operative treatment of traumatic iridodialysis.** Ann. d'Ocul., 1935, v. 172, Sept., pp. 775-783.

The article consists of a case report and a review of the literature on this subject. A child of 12 years received a severe blow on the eye, resulting in a large iridodialysis and a traumatic cataract. A conjunctival flap was prepared as for an Elliot trephining. A puncture was made into the angle of the anterior chamber at the site of the iridodialysis. The iris was grasped and pulled into the wound, but was not sutured. The swollen lens material was removed later. A good functional and cosmetic result was obtained. This is a useful operation and not so dangerous as commonly supposed. John C. Long.

Sala, Guido. **"Xanthomatosis lentis."** Boll. d'Ocul., 1935, v. 14, Feb., pp. 266-281.

A man of thirty years, who twelve years before had sustained a perforating wound of the right eye, showed an opaque lens with an upper zone of opacification surrounded by a horseshoe opacity of yellowish color containing red and green crystals. The biomicroscopic aspect of the lens is described, and its histologic and histochemical character after extraction. (Bibliography, 6 figures.) M. Lombardo.

Schreiber, Z. **Large subepithelial corneal hematoma.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 131.

In squeezing together his lids after instillation of a drop of local anesthetic, the patient caused rupture of an intracorneal blood vessel—part of a trachoma pannus. The blood was released by incision, and in three days the cornea had healed. F. Herbert Haessler.

Szily, A. **History of the occurrence of lymph follicles in the interior of the eye.** Klin. M. f. Augenh., 1935, v. 95, Aug., p. 173. (Ill.)

The literature contains only a few such observations. In all there had been a preceding spontaneous or artificial perforation of the eyeball. Therefore one must assume that the noxa leading to formation of follicles penetrated from outside. C. Zimmermann.

Yver and Barrat. **A case of lens abscess.** Arch. d'Opht., 1935, v. 52, Sept., p. 676.

A workman received a blow on the right eye from a piece of wood. Next

day there was marked chemosis of the lids, as well as bulbar congestion. No foreign body was demonstrated either by examination or X ray, although a perforating wound of the cornea was present. Hypopyon developed but cleared somewhat under treatment. The lens was at first clear, but later a yellow spot appeared in its lower part. This increased in size. Through a paracentesis the lens abscess was opened with a cystotome. The pus showed a pure culture of staphylococcus. Finally enucleation was necessary. Pathologic examination showed a typical abscess of the lens and anterior chamber. No foreign body was found, but the author believes that a small fragment of wood escaped observation when the anterior chamber was evacuated. (Illustration.)

Derrick Vail.

17. SYSTEMIC DISEASES AND PARASITES

Agnello, F. **Angiosclerotic ocular lesions and hypacusia.** Riv. Oto-Neuro-Oft., 1935, v. 12, March-April, pp. 295-305.

The writer reports two cases of chronic glaucoma, one of subacute glaucoma, one of atrophic macular spots from hemorrhage, one of thrombosis of the central vein, and one of retinitis circinata, all associated with hypacusia. The age of the patients varied from fifty-six to eighty years. Hypacusia in old age is very frequently connected with arteriosclerosis. Ocular diseases connected with hypacusia present sclerosis of the retinal arteries. The two special sense organs have an elective affinity toward special organic poisons or special stimuli; this affinity being based on the structural analogy between retinal epithelium and Corti's organ and on the common vascular nervous supply from the cervical sympathetic. (Bibliography.)

M. Lombardo.

Bertsch, M. **The reticulo-endothelial system of the eye and disturbances of fat metabolism.** Arch. d'Opht., 1935, v. 52, Sept., p. 663.

After reviewing the various disturbances of the reticulo-endothelial system (Gaucher's disease, Niemann-Pick disease, Tay-Sachs amaurotic idiocy, and Schüller-Christian disease) the author concludes that the visual apparatus almost constantly participates in diseases of fat metabolism. In the presence of exophthalmos, or of lesions of the oculomotor apparatus (nystagmus, strabismus), in an apathetic infant; or of blindness in an idiot child, not only is it necessary to make a complete ocular examination but always to think of the possibility of disturbance of fat metabolism and particularly of one of the diseases mentioned above. (Bibliography.)

Derrick Vail.

Kiewe, P., and Maneff, I. **Bilateral congenital and familial melanosis of the eye and face.** Ann. d'Ocul., 1935, v. 172, Sept., pp. 723-728.

The case occurred in an Italian man of 64 years. There were numerous small grayish-brown spots on the face, lids, and palpebral conjunctiva. The bulbar conjunctiva was mottled with rather large irregular brown patches. The dark brown irides presented superficial verrucosities. Bilateral cortical cataracts were present. Slitlamp examination showed that the ocular pigmentation was in the deeper part of the conjunctiva and in the superficial layers of the sclera. The parents of the patient were first cousins. One son of the patient, aged eight years, had the same type of pigmentation of the eyes and face. The fundus was of a metallic gray color. Vision was normal. (Family tree, four drawings, review of literature)

John C. Long.

Melo, Guedes de, Jr. **Ethmoidal mucocele.** Arquivos do Instituto Penido Burnier, 1934, v. 3, Dec., pp. 174-182.

The mucocle filled more than one-half of the orbital cavity, and it was complicated by secondary glaucoma leading to evisceration of the eyeball. The clinical diagnosis was confirmed by orbital puncture and analysis of the contents, and by radiography after injection of lipiodol. The author raises the question whether the secondary glaucoma was due to a uveitis provoked by the mucocele. (36 references, 3 illustrations.)

W. H. Crisp.

Nazarov, V. **Ocular diseases in malaria.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 874.

Practicing in a region where thirty percent of the population is affected with malaria the author finds ocular involvement infrequent but bizarre in its manifestations. Ray K. Daily.

Poliak, G. D. **Surgery in lesions of the macula and optic nerve.** Sovietskii Viestnik Opht., 1935, v. 6, pt. 6, p. 821.

The author reports a case of cysticercus situated between the macula and the optic disc, removed through a scleral incision, after exposing this region by rotating the eyeball strongly upward with episcleral sutures.

Ray K. Daily.

Sales, Monteiro. **The diagnosis of human cysticercosis.** Arquivos do Instituto Penido Burnier, 1934, v. 3, Dec., pp. 183-196.

The author discusses the means of diagnosis of human cysticercosis upon the basis of fifteen cases, ten of which were ocular. He regards complement fixation as the most important diagnostic measure, and he gives a detailed description of the preparation of antigens. Unfortunately, positive reactions are somewhat less uniformly present in ocular cases, the author's ten ocular cases having yielded only seven positive results by complement fixation. The reaction was always negative in the simultaneous presence of syphilis. (References, 4 illustrations.)

W. H. Crisp.

Weinstein, Paul. **The connection between the vascular system and eye diseases.** Arch. f. Augenh., 1935, v. 109, Oct., p. 363.

The author made tonoscillographic measurements, indicating the condition of the vessel walls, on 520 persons. The normal tonoscillogram made an excursion of 10 to 12 mm. in 80.6 percent of the cases; of 5 mm., so-called atonic curve, in 10.6 percent of the cases, and from 12 to 15 mm. in 8.6 percent of the cases. In various diseases with hemorrhage in the eyeball the excursion was above 15 mm. in 82.7 percent; 5.7 percent having an atonic curve and 11.4 percent a normal curve. In nicotine amblyopia, and in 77 percent of cataractous patients, the tonoscillograms showed increased oscillations. In acute glaucoma the vessel walls seemed to have good tonus, while in simple glaucoma they were rather arteriosclerotic. Persons with a high grade of arteriosclerosis, as well as those who suffer from nephrosclerosis, diabetes, or cataract, rarely show a disposition to glaucoma. R. Grunfeld.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Bailliart, P. **Professor Gonin (1870-1935).** Ann. d'Ocul., 1935, v. 172, Sept., pp. 721-722.

This is a tribute to the late Professor Gonin and a recognition of the importance of his work on the treatment of retinal detachment. John C. Long.

Burnier, Penido. **The question of the contagiousness of trachoma.** Arquivos do Instituto Penido Burnier, 1934, v. 3, Dec., pp. 152-157.

The author supports (in Portuguese) the opinion that trachoma is not an extremely contagious disease. A few affected individuals would be inadequate for dissemination of the disorder. To contaminate a whole country a veritable army of trachomatous persons would be necessary. Trachoma was introduced into the Brazilian states by European immigrants. W. H. Crisp.

Carlin, Carlos. **Victor Morax.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, June, pp. 286-289.

An obituary.

Chance, Burton. **Short studies on the history of ophthalmology. 2. Sir Jonathan Hutchinson, the greatest "generalized specialist," and his contribution to ophthalmology.** Arch. of Ophth., 1935, v. 14, Aug., pp. 203-228.

This biographer points out that Paget's influence during Hutchinson's early training determined largely the latter's course in practice. A better understanding of the man and his times is obtained from accounts of his clinical

observations and the history of presentation of his papers. (Photographs.)
J. Hewitt Judd.

Davidson, M. **The traumatic ophthalmoplegias as a workmen's-compensation problem.** Amer. Jour. Ophth., 1935, v. 18, Nov., pp. 1030-1035.

Diaz Caneja, Emilio. **Victor Morax.** Arch. de Oft. Hisp. Amer., 1935, v. 35, June, pp. 286-289.

An obituary.

Gala, A. **Evaluation of earning capacity after eye injuries.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 1-15.

This is a plea to medical experts and ophthalmologists of Czechoslovakia to collaborate in judgment of the earning capacity of the patient after eye injuries. Laws of other countries are cited. The author estimates loss of one eye as decreasing earning capacity 25 percent, loss of both eyes 125 percent. He also charts partial loss.
Georgiana Dvorak-Theobald.

Marquez, M. **Victor Morax.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, June, pp. 282-286.

An obituary.

Martell, P. **The history of ophthalmology.** Zeit. f. Augenh., 1935, v. 87, Sept., p. 133.

In six pages the author reviews the history of opthalmology from the time of the Ebers Papyrus and through the 19th century, without adding any new facts. F. Herbert Haessler.

Montlaur, H. **Syphilis among the blind.** Arch. d'Opht., 1935, v. 52, Aug., 586.

This is a statistical and hereditary study of syphilis discovered in systematic examination of blind patients at a medical center which has done fine work in diagnosis and treatment of blind syphilitics and their descendants. The influence of hereditary (or congenital) syphilis was found much more important as a cause of blindness than acquired syphilis. Only family investigation, methodically conducted, makes it possible to relate the lesion to its true cause by finding evidence of ancestral syphilis. Familial transmission is more usually by women who may themselves escape the disease. Prevention of syphilitic blindness thus depends especially on treatment of the pregnant woman.
Derrick Vail.

Reis, Wiktor. **A literary document as to spectacles at the beginning of the fourteenth century.** Folia Ophth. Orientalia, 1934, v. 1, Sept.-Dec., pp. 399-403. (See Amer. Jour. Ophth., 1935, v. 18, Jan., p. 99.)

Rochon-Duvigneaud, A. **Albert Terson (1867-1935).** Ann. d'Ocul., 1935, v. 172, Aug., pp. 625-631.

Albert Terson was killed on June 9, 1935, by being struck by a taxicab. Born and educated in Toulouse, later coming to Paris to practice ophthalmology, he maintained throughout his scientific studies a great interest in art and literature. He was one of the directors of Annales d'Oculistique.
John C. Long.

Senâ, J. A. **Some medicolegal considerations in workmen's compensation for eye injuries.** Arch. de Oft. de Buenos Aires, 1935, v. 10, July, p. 544.

Two classes of contributing cause are discussed from a medicolegal standpoint: the preexisting cause and the supervening cause. Examples of the former are: high myopia in which mild contusion may cause detachment, chronic dacryocystitis in which a slight corneal erosion may produce ulcus serpens, and diabetes leading to unusual complications. An example of the supervening contributing cause is infection of an eye with trachoma or blennorrhea shortly after injury by a foreign body or caustic. The arguments are illustrated by a case in which gonorrheal conjunctivitis in an individual afflicted with acute urethritis led to loss of an eye a few days after a lime burn. The author, as expert ophthalmologist attached to the Argentine Department of Hygiene, found causal relation between the accident and the loss of the eye.
M. Davidson.

Shimkin, N. I. **Blindness, eye diseases, and their causes in the Land of Canaan.** Brit. Jour. Ophth., 1935, v. 19, Oct., p. 548.

This is an extremely interesting contribution and represents an unusually careful historical study of the subject, much of which is by deduction and interpretation from the Bible. The Land of Canaan had nearly the same area, density of population, and climate as obtain today. A comparison of ancient eye diseases with similar causes in modern Palestine is made. Two main causes for the spread of eye diseases resulting in blindness were the caravan roads (these avenues of communication being thoroughly infected) and the hot, dry climate, plus the ignorance of the lower classes. The spread of trachoma and of acute conjunctivitis is discussed. Better social conditions and government activity have immeasurably improved modern Palestine. Present eye diseases resulting in blindness are a direct continuation of diseases existing in Canaan 3,500 years ago. D. F. Harbridge.

Weve, H. J. M., and ten Doesschate, G. **The letters of Albrecht Graefe to F. C. Donders (1852 to 1870).** Klin. M. f. Augenh., 1935, supplement to v. 95.

It was the wish of Donders that these 67 letters should be published to help complete the biography of Albrecht Graefe. The last letter was written shortly before Graefe's death on July 19, 1870. The letters attest the intimate friendship between these two men and will be read with great interest.

C. Zimmermann.

Zahor, Aleksej. **Difficulty in estimation of eye injuries for accident insurance.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 15-20.

Insurance rates differ in Praha, Brno and Bratislava. Analogous visual losses therefore are not compensated equally. The author discusses various injuries and their consequences, and stresses the necessity of uniformity in estimating visual loss.

Georgiana Dvorak-Theobald.

Zahor, Aleksej. **Data from statistics of blind people in Czechoslovakia.** Ceskoslovenska Oft., 1935, v. 2, no. 1, pp. 53-56.

In a recent census, 4,037 blind were found in a population of 7,109,376 people. Senile cataract was the most frequent cause. Other important causes were injury, luetic atrophy of the optic nerve, and glaucoma. Of the blind children (up to fifteen years) 28.4 percent were blind through ophthalmia neonatorum.

Georgiana Dvorak-Theobald.

19. ANATOMY AND EMBRYOLOGY

Behr, Carl. **The anatomy and clinical aspect of the septal tissue and of the arterial relations in the optic nerve trunk.** Graefe's Arch., 1935, v. 134, p. 227.

Serial sections were made from ten optic nerves of individuals of widely varying age. All the blood vessels supplying the trunk of the optic nerve penetrate from the pial sheath. The central retinal artery, distal to the point where it enters the nerve trunk from the intervaginal space, does not take any part in the nutrition of the nerve. The picture of embolus of the central artery may therefore be due to closure of the vessel far behind the retina. In the intracranial part of the optic nerve the septa lying in the axis of the nerve, in which the papillomacular bundle runs, are not only thinner but also sparser than in other places, so that the thickness of the bundles of nerve fibers enclosed by them is considerably greater than in other parts of the nerve. The lesser nourishment of the papillomacular bundle in the intracranial part of the nerve sufficiently explains the occurrence of retrobulbar axial optic neuritis or central scotoma from toxic amblyopia, in multiple sclerosis as well as in the Foster-Kennedy syndrome.

The trunk of the optic nerve is nourished by three arterial systems, which anastomose broadly with one another: in the region of the lamina cribrosa by branches derived from the posterior ciliary arteries, in the anterior and middle thirds of the intraorbital part of the

nerve by branches (anterior arteries of the optic nerve) accompanying the central retinal artery into the nerve, in the posterior third by arterial twigs (posterior arteries of the optic nerve) derived from the ophthalmic artery. This detailed work of forty pages sets forth a number of other important anatomic facts. H. D. Lamb.

Kreiker, A. **The structure of the normal conjunctival epithelium.** Graefe's Arch., 1935, v. 134, v. p. 280.

The conjunctival epithelium is basically composed of several layers of cuboidal epithelial cells. All changes in form from the cuboidal are due to mechanical and functional causes.

H. D. Lamb.

Perez Llorca, J. **About the cyclopean eye, with case report.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Sept., pp. 479-488.

This is a report of a typical case of cyclopia with rhinocephalus in a full-term fetus that lived only a few minutes. There was only one orbital cavity containing a single eye, and two lacrimal glands. No trace of lacrimal sacs was found. The eye had only one optic nerve externally. Internally it was divided into two cavities by an anteroposterior septum. Each cavity contained one optic papilla, one lens, and one pupil. This was therefore a case of fusion of two eyes in one, each preserving all the elements of a single eye. The different theories as to pathogenesis are briefly discussed. (6 illustrations.) R. Castroviejo.

Reiser, K. A. **The innervation of the cornea.** Arch. f. Augenh., 1935, v. 109, Oct., p. 251.

The author split the cornea into five parallel layers and stained them by the Bielschowsky-Gross impregnation method. Every corneal layer including the central part possesses nerve fibers, which retain in the cornea an extremely delicate myelin sheath. In all layers they form plexuses, called fundamental plexuses. From the narrow-meshed subbasal plexus is derived the preterminal network, the meshes being formed by thin bundles of three or four fibrils which as rami perforantes pass through the basal membrane in a vertical direction to enter the epithelial layer. These rami perforantes branch again to form numerous plexuses parallel with the corneal surface. In the epithelium the fibrils again diverge to form a honeycomb reticulum, and they unite again as nerve fiber. The terminal reticulum is in intimate plasmatic relation with the cell. Krause's end bulbs, such as are present at the limbus and in the conjunctiva, are never found at the corneal center. The cornea has only one kind of nerve fiber, but the terminal reticulum performs both sensory and trophic functions. R. Grunfeld.

Theobald, G. D. **Schlemm's canal: its anastomoses and anatomic relations.** Trans. Amer. Ophth. Soc., 1934, v. 32, pp. 574-595.

The author's work in the main confirms that of Maggiore, Sondermann, and other observers. The collective channels were found to be more numerous than had been ordinarily believed. He discusses the anatomy and significance of Schlemm's canal, as to whether it contains blood and the elimination of intraocular fluids through it. From examination of over eight hundred serial sections five models were made, each representing 1 mm. of the canal and showing the connections of the collector channels and the disposition of the surrounding vessels. The anatomic description (beautifully illustrated) does not lend itself to abstraction. C. Allen Dickey.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth

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News items should reach the Editor by the twelfth of the month.

Deaths

Dr. J. E. Jennings, St. Louis, died December 4, 1935, aged 73 years.

Dr. Daniel Kerfoot Shute, Washington, D.C., died October 21, 1935, of coronary thrombosis.

Dr. William Cohen, Brooklyn, died September 10, 1935, aged 45 years.

Dr. R. H. Neman, Knoxville, Tenn., died October 13, 1935, aged 55 years.

Miscellaneous

The American Board of Ophthalmology, will hold its 1936 examinations in Kansas City, Mo., on May 11th, and in New York City, in October. All applications and case reports must be filed sixty days before the date of the examination. Information, syllabuses, and application forms are obtainable from Dr. Thomas D. Allen, Assistant Secretary, 122 S. Michigan Avenue, Chicago, Ill.

The Tenth Annual Spring Graduate Course in Ophthalmology and Otolaryngology will be held at the Gill Memorial Eye, Ear and Throat Hospital in Roanoke, Virginia, from April 6 to 11, 1936. The following men will appear on the program: Dr. Wells P. Eagleton of Newark, N.J., Dr. Perry G. Goldsmith of Toronto, Canada, Drs. John A. Kolmer, James A. Babbitt, Robert H. Ivy, Walter I. Lillie, J. Milton Griscom, all of Philadelphia, Dr. Wendell L. Hughes of Hempstead, L.I., and Dr. Meyer Wiener of St. Louis. The class will be strictly limited to fifty men.

The Radiological Review and Chicago Medical Recorder, published at Quincy, Ill., since 1924, will change its name beginning in January and become the Radiologic Review and Mississippi Valley Medical Journal, the official publication of the recently formed Mississippi Valley Medical Society. Dr. Harold Swanberg, the Secretary-Treasurer of the Mississippi Valley Medical Society and Editor of the old Journal will remain as Editor. The Editorial Board of the Radiologic Review will be supplemented by an Editorial Board from the membership of the Mississippi Valley Medical Society comprising the following physicians: Drs. Isaac A. Abt and Karl A. Meyer of Chicago, Drs. M. Pinson Neal and Dan G. Stine of Columbia, Mo., Drs. Quitman U. Newell and Meyer Wiener of St. Louis, Dr. F. Garm Norbury of Jacksonville, Ill., and Dr. Walter Stevenson of Quincy, Ill. The new publication will be published by the Radiologic Review Publishing Company, at Quincy, Illinois.

Societies

The first meeting this season of the Washington, D.C. Ophthalmological Society took place on November 4th at the Episcopal Eye and Ear Hospital. The program was as follows: The pathology of ocular diabetes, by Major Raymond O. Dart; Report of an interesting case of diplopia with negative findings, by Capt. Robert F. Bradish. The ocular fundus in the diagnosis of medical diseases, by Dr. Wallace M. Yater, Professor of Medicine of the Georgetown University School of Medicine. The next meeting of the Society will be on January 6, 1936. The program will be as follows: Malignant melanoma, by Major Raymond O. Dart; The screen test and its application, by guest speaker Dr. James Watson White of New York; The importance of sight-saving classes, by Dr. Frank D. Costenbader.

The Eye Section of the Philadelphia County Medical Society gave the following program on December 5, 1935: Nodular tertiary lues involving the left orbital integument, by Dr. R. J. Kennedy; Hyperplasia of the cornea following ulceration, by Dr. Henry O. Sloane; Problems in lighting which concern the ophthalmologist, by Mr. Earl L. Canfield, Illuminating Engineer, New York City; Filling the doctor's lighting prescription, by Mr. Henry V. Ryder, Member Illuminating Engineers' Society.

Personals

Dr. Marc Amsler has been appointed to succeed the late Professor Gonin as Professor of Ophthalmology at the University of Lausanne.